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~~████████~~ FINAL
SITE INSPECTION

NAVAL AMPHIBIOUS BASE LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

CONTRACT TASK ORDER 0042

Prepared For:

NAVAL FACILITIES
ENGINEERING COMMAND
ATLANTIC DIVISION
Norfolk, Virginia

Under:

Contract N62470-89-D-4814

Prepared By:

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~~██████~~ 1994

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1.0 INTRODUCTION

This Report was prepared to present the results of a Site Inspection (SI) at the Naval Amphibious Base Little Creek (NAB Little Creek), in Virginia Beach, Virginia. Figure 1-1 provides the location of NAB Little Creek. The two sites addressed during this SI include: Site 5, Buildings 9 and 11, Motor Oil Disposal Area, and Site 16, PCB Capacitor Spill, Pole No. 425. Figure 1-2 indicates the location of each site. The following sections describe the purpose and objectives for the SI.

1.1 Purpose

The purpose of the SI was to fill information gaps and collect additional site-specific data necessary to fully evaluate site conditions, and assess the need for any further investigative or remedial action, as part of the Navy's Installation Restoration (IR) Program.

1.2 Objectives

The SI collected site-specific data to satisfy the objectives presented in the Atlantic Division (LANTDIV) Scope of Work dated July 18, 1991. This work was conducted in accordance with the Comprehensive Long-Term Environmental Action Navy (CLEAN) Program, Contract No. 62470-89-D-4814, Contract Task Order (CTO) 0042, the Implementation Plan and Fee Proposal (IP/FP), dated December 9, 1991 and March 9, 1993, and the recommendations provided by Ebasco Environmental in their document entitled "Draft Preliminary Site Inspection, Naval Amphibious Base Little Creek, Norfolk, Virginia, July 1991."

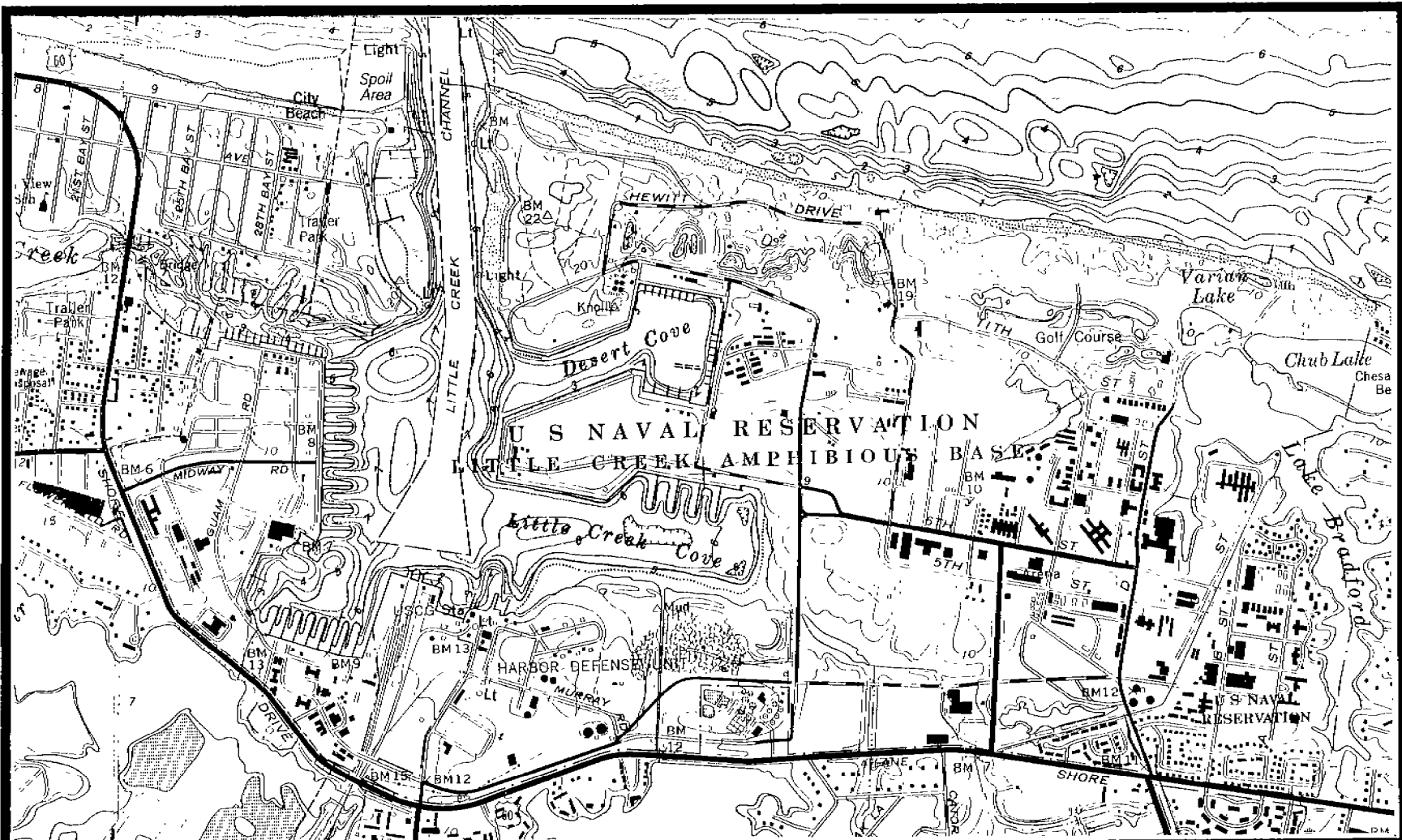
Two previous investigations were conducted at Sites 5 and 16 at NAB Little Creek, and the reports for these investigations have been incorporated into this SI. These reports include:

- Initial Assessment Study (IAS) - Rogers, Golden, and Halpern, December 1984.
- Preliminary Site Inspection (PSI) - Ebasco Environmental, July 1991.

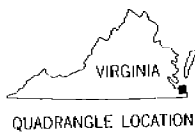
The Interim Remedial Investigation (IRI) at NAB Little Creek, also conducted by Ebasco Environmental in 1991, was performed in conjunction with the PSI. A Remedial Investigation/Feasibility Study/Risk Assessment (RI/FS/RA) was performed in conjunction with this SI.

1.3 SI Report Organization

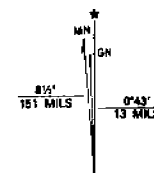
This Report presents the results of the tasks and activities conducted at the NAB Little Creek for the SI. Section 2.0 presents the background information for each site, and Section 3.0 presents the field investigation activities conducted at each site. Section 4.0 provides site descriptions and the physical data gathered from each site. Section 5.0 presents analytical data and the nature and extent of the contaminants at each site, while Section 6.0 presents the SI conclusions and recommendations for the two sites at NAB Little Creek.



**LITTLE CREEK AMPHIBIOUS BASE
VIRGINIA BEACH, VIRGINIA
SITE LOCATION MAP**



Little Creek, VA Quadrangle
7.5 Minute Series (Topographic)



UTM GRID AND 1986 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

Prepared by:
Foster Wheeler Enviresponse, Inc.

Date: January 29, 1992

Figure 1.1
Scale: 1" = 2000'

2.0 SITE BACKGROUND AND PHYSICAL SETTING

The NAB Little Creek, located in Virginia Beach, Virginia, provides logistic facilities and support services for local commands, organizations, homeported ships, etc., to meet the amphibious warfare training requirements of the Armed Forces of the United States. The facility is adjacent to the city line of Norfolk. The area surrounding this 2,147-acre facility is low lying and relatively flat with several fresh water lakes. Chub Lake, Lake Bradford, Little Creek Reservoir/Lake Smith, and Lake Whitehurst are located on, or adjacent to, the facility.

The NAB Little Creek was commissioned on July 30, 1945, by combining four contiguous activities. The Navy began purchasing land in the area from private estates and the Pennsylvania Railroad just prior to the outbreak of World War II. The first activity to be commissioned was the Amphibious Training Base in the southwestern corner of the present base near Little Creek Harbor. The base's mission was the training of landing craft personnel for operational assignments. Over the last fifty years, the NAB Little Creek has expanded in both area and the complexity of its mission (PSI, 1991).

Environmental investigations at the two sites were initially documented in the IAS. In 1975, the Department of Defense initiated a program to investigate past disposal sites at military installations. This program, the Navy Assessment and Control of Installation Pollutants (NACIP), called for a three-phase operation. Phase One was the IAS to identify potentially contaminated areas. Phase Two was the Confirmation Study to verify and/or characterize the contamination. Phase Three includes the Remedial Action. The program was changed in 1986 to reflect the requirements of the Superfund Amendment and Reauthorization Act (SARA) and is now called the Installation Restoration Program (IRP). This SI has been conducted as part of the IRP.

2.1 General Site Characteristics, Location, and History

The following sections focus on the overall facility and are common to both sites at NAB Little Creek.

2.1.1 Location

The NAB Little Creek is located in the Atlantic Coastal Plain physiographic province in southeastern Virginia. This portion of Virginia is also referred to as the Tidewater Area. The facility is bounded on the north by Chesapeake Bay, the east by Lake Bradford, and the south by Shore Drive. The facility's western boundary stretches over the Norfolk-Virginia Beach border. The central portion of the base is composed of Little Creek Cove, Desert Cove, and the Little Creek channel that connects with Chesapeake Bay. Nearly all of the installation lies within the jurisdictional boundary of Virginia Beach (IRI, 1991). Land use at the base is primarily industrial, while land development surrounding the site is suburban and industrial. The industrial development supports many large shipyards in the area.

The NAB Little Creek has low subdued relief. Elevations at NAB Little Creek range from mean sea level along the Chesapeake Bay and Little Creek Cove to elevations as high as 40 feet above mean sea level at some of the larger dunes along the Bay. The average elevation of the facility is 10 feet above

mean sea level. The primary surface features of the Tidewater Area are many rivers, lakes, and marshy areas (IRI, 1991).

2.1.2 Climate

The climate of the Tidewater area is affected by the proximity of the Chesapeake Bay and Atlantic Ocean. These two large water bodies attenuate seasonal climatic changes resulting in mild winters and warm summers. Average total annual precipitation is 45 inches, with approximately 56 percent of the rainfall occurring from April to September. The maximum 24-hour rainfall reported at Norfolk is 11.4 inches in August 1964. Snowfall in the area averages approximately 7.2 inches per year. Temperatures for the region range from a winter average of 42°F to a summer average of 77°F. The hottest temperature recorded is 104°F in August 1980 and the lowest temperature on record for the area is -3°F in January 1985.

Relative humidity in the area ranges from an average of 57 percent at mid-afternoon to an average high of 78 percent at dawn. The prevailing wind direction is to the southwest with an average speed of 10.6 mph.

2.1.3 Population Distribution

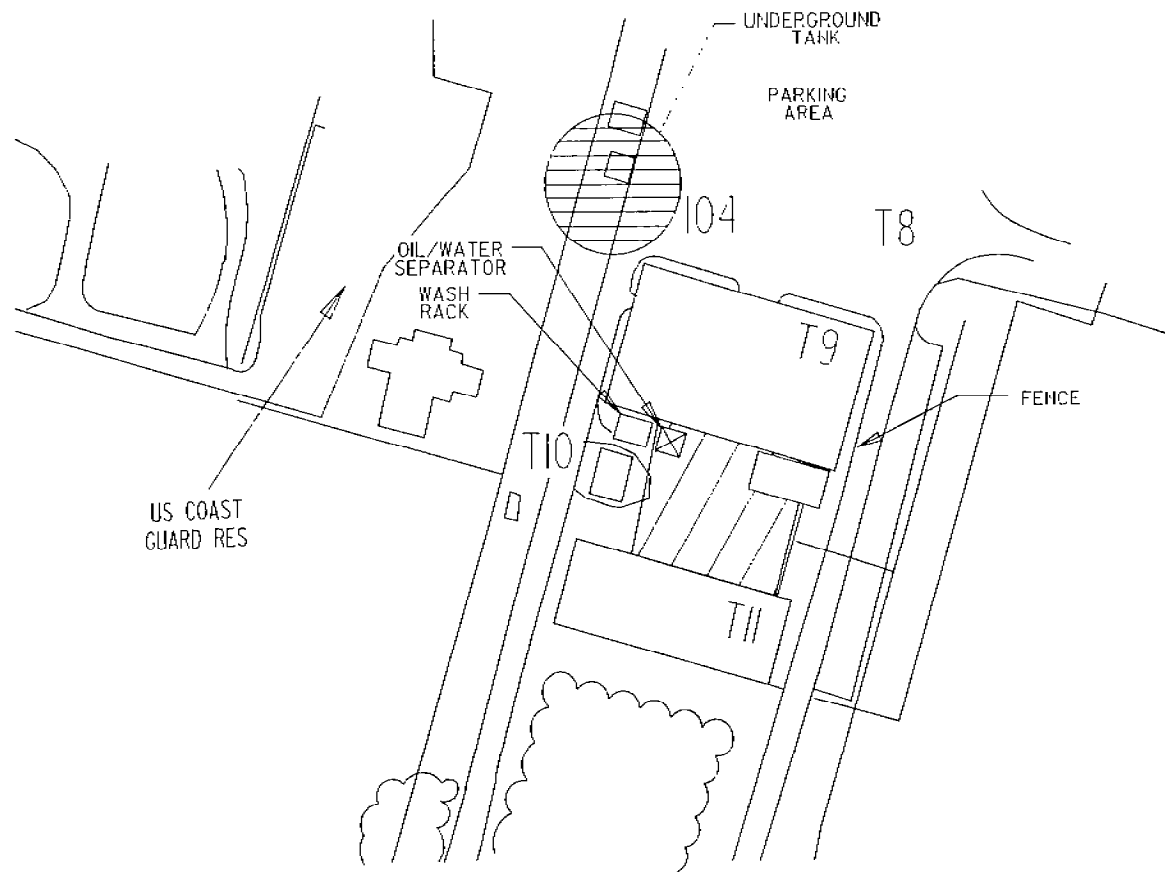
At full complement, NAB Little Creek has approximately 13,650 personnel. The base population increases during the summer, when much of the amphibious training of Navy and Marine Corps Reservists occurs. Approximately 43 ships are homeported at the base (IRI, 1991).

2.1.4 Site Descriptions

The locations of the two sites studied are shown on Figure 1-2. A discussion of past activities and physical description of each site is provided in the following paragraphs. Information concerning each site was obtained from the reports of studies conducted earlier, as listed in Section 1.0.

Site 5 - Building 9 and 11, Motor Oil Disposal Area

Site 5 consists of the area between Buildings 9 and 11, shown on Figure 2-1, and measures approximately 100 feet by 150 feet. There is very little topographic relief in this area and drainage from rainfall appears to be to the west-southwest past Building 10. A small, concrete-bermed drum storage area, approximately 10 feet by 10 feet, and an oil/water separator are located on the northern side of Site 5 along Building 9. A drain in the middle of the concrete storage area is connected to the oil/water separator. The area between the buildings was previously covered by Marsden matting. This matting was made of hinged, rigid steel panels, which were not perforated or otherwise open for the infiltration of precipitation or spilled materials. Observations during a January 1992 site visit by FWES indicated that the matting had been removed.



0 100' 200' 300'
SCALE IN FEET

SOURCE: BASE MAP PROVIDED BY LANTDIV

FIGURE 2-1
SITE MAP
SITE 5
BUILDINGS 9-11 MOTOR OIL
DISPOSAL AREA MAP
NAB - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA



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Buildings 9 and 11 have been used continuously since 1943 by Special Warfare Group 2. In April 1991, Building 11 was in the process of being demolished to make way for new facilities, and only the concrete slab foundation and subsurface cable trench were to remain. By January 1992, Building 11 was removed; however, Building 9 was still in place.

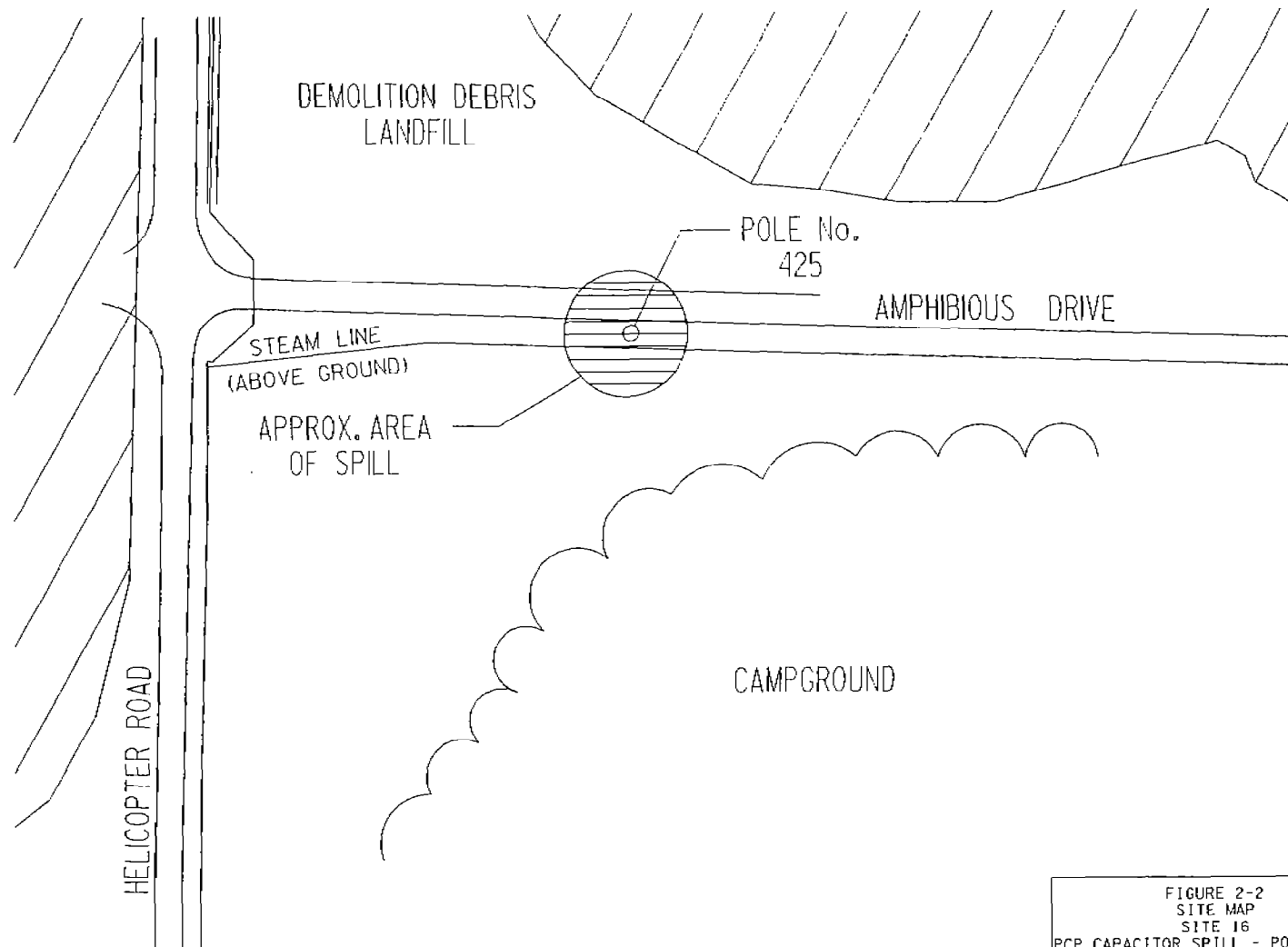
Building 11 was originally built as a cable tank building. The exact usage of these cable tanks is unknown. A records search indicated that the building was previously occupied by the Naval Inshore Underwater Defense Command. This organization has not existed for many years but was responsible for the defensive mining of coastal water to keep German U-Boats from infiltrating the harbor. The exact usage of the cable tanks would be speculative. They may have been used to store or perform maintenance on the mooring cables for the mines. The ten, 20 by 25 by 8 feet cable tanks were backfilled with select fill and capped with a concrete cover in 1969. Three pits near the center of the floor, two with openings of 4 by 4 feet and one with an opening of 4 by 8 feet were covered with steel plates. From 1969 until 1981, motor oil, solvents, and antifreeze from boat engines maintained in Building 11 were disposed into these pits through holes in the steel plates (IAS, 1984). The IAS reported that 2,285 gallons of oil were generated annually from activities in Building 11. If similar quantities are projected back to 1969, as much as 43,000 gallons may have been disposed at Site 5 (PSI, 1991).

Building 9 was used for motor pool maintenance, including trucks, trailers, and general purpose military vehicles. Used motor crankcase oil from this maintenance shop was reportedly disposed in the area covered by the Marsden matting between Buildings 9 and 11 (IAS, 1984). The IAS estimated that 1,230 gallons of oil and antifreeze were disposed each year. It is presumed that similar quantities were used in the past, since the level of activity has remained fairly constant. The potential quantity generated at Site 5 could be as high as 50,000 gallons of oil and antifreeze. Since some of the activities at Buildings 9 and 11 were similar (i.e. motor maintenance) it is possible that solvents are also among the potential contaminants generated from Building 9. There is no visible evidence at the site, based on observations made in December 1990 and April 1991, that would suggest disposal activities of this magnitude had occurred on or near the Marsden matting.

Site 16 - PCB Capacitor Spill, Pole No. 425

The area of the PCB capacitor spill around Pole No. 425 is shown on Figure 2-2. Pole No. 425 is located approximately 300 feet east of the intersection of Amphibious Drive and Helicopter Road on the south side of Amphibious Drive, approximately 12 feet from the road. This area of the facility is relatively level with a preferred direction of runoff to the north toward a swampy area in the woods, approximately 300 feet north of the road. During heavy rainstorms, water ponds in the grassy area where the pole is located between Amphibious Drive and the wooded area to the south until it reaches the level of the road and then drains to the north. An above-ground steam line parallels Amphibious Drive in this area and is located between Pole No. 425 and the woods, approximately 25 feet south of Amphibious Drive (PSI, 1991).

A campground is located in the wooded area south of Amphibious Drive. Access to the camping area is gained by two driveways located 50 feet east and 50 feet west of Pole No. 425. An electrical hookup



SOURCE: BASE MAP PROVIDED BY LANTDIV

FIGURE 2-2
SITE MAP
SITE 16
PCP CAPACITOR SPILL - POLE No. 425
NAB - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

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from Pole No. 425 to the campground was installed after the PCB spill. During installation a ditch was excavated from Pole No. 425, passing southward through the woods, approximately 40 feet, to the area that had been cleared for the campground. The depth of the ditch is estimated to have been between two and three feet. After completion of the electrical hookup, the area was regraded and revegetated.

Less than five gallons of dielectric fluid were found missing from the capacitor, formerly attached to Pole No. 425, after a lightning strike in the early 1980s (IAS, 1984). The capacitor has since been removed from the pole, but the pole is still in use. There is no visible evidence currently at the site that would indicate a spill of PCB-laden fluid.

2.2 Regional Geology

The Norfolk, Virginia area is located within the Atlantic Coastal Plain Physiographic Province. The region is underlain by several thousand feet of unconsolidated deposits of gravel, sand, and clay ranging in age from Lower Cretaceous to Holocene. These sediments overlie a bedrock basement of Precambrian and Triassic/Jurassic age. Generally, the unconsolidated deposits dip and thicken gently eastward, with thicknesses ranging from 2,000 to 4,000 feet. The Coastal Plain of Virginia is divided into six units. From oldest to youngest, they are:

- Patuxent Formation (Transitional Beds),
- Mattaponi Formation,
- Nanjemoy Formation,
- Calvert Formation,
- Yorktown Formation, and
- Columbia Group (Teifke, 1973).

The Patuxent Formation of Early Cretaceous age overlies the bedrock "basement." The Patuxent is an alternating sequence of fine gravel, coarse sand, and silty sandy clay. Sand within the Patuxent is mainly tan, gray, or white and characteristically feldspathic.

In southeastern Virginia, transitional beds of Early Cretaceous age are found above the Patuxent Formation. The transitional beds consist of sand, silt, and clay. These beds are either intermediate in composition and texture or comprise alternations of lithotypes characteristic of the Patuxent and Mattaponi Formations.

The Mattaponi Formation is of Upper Cretaceous, Paleocene, and Eocene age. The formation is of marine origin and characterized by beds of quartz-glaconite sand, glauconitic clay, and shells (Teifke, 1973).

The Calvert Formation of Miocene age, which is commonly consolidated, consists largely of clay and silty clay. A basal sand member consisting of medium-to-coarse sand may be present in the Calvert Formation, with some beds or lenses of phosphatic clay.

The Yorktown Formation consists of more abundant and markedly coarser sand and gravel beds, and more abundant and thicker shell beds, than the underlying Calvert Formation. The Yorktown is also lighter in color than the upper member of the Calvert.

The uppermost geologic unit, the Columbia Group, is characterized by beds of light-colored clay, sand, and silt. The average thickness of the unit ranges from 20 feet in the western part to 50 feet in the eastern part of the physiographic province (Oaks and Coch, 1973).

The natural surficial geologic units at NAB Little Creek are an unnamed Holocene sand, which forms the coastal barrier islands and beach-dune ridges bordering Chesapeake Bay, and the Lynnhaven Member of the Upper Pleistocene Age Tabb Formation (Mixon et al., 1989). Sites 5 and 16 are located in the Lynnhaven Member of the Upper Pleistocene Age Tabb Formation. This unit consists of clayey and silty sand and sandy silt grading downward into a pebbly and cobbly fine to coarse gray sand. The thickness of the Lynnhaven Member of the Tabb Formation ranges from 0 to 20 feet (Mixon et al., 1989). This unit contains the Columbia, or water table aquifer, at the project site.

2.3 Soil Sequences

The natural soils at the NAB Little Creek have been largely disturbed by construction activities. The IAS estimated that 90 percent of the surface sediments at the base are either urban or dredged from the surrounding waterways, and other soils have been imported. Only 14 acres of undisturbed marsh land remain out of the total 2,147 acres present at the NAB Little Creek.

The US Department of Agriculture, Soil Conservation Service (SCS, 1985) lists two general soils for the NAB Little Creek:

- Newhan-Duckston-Corolla - occurring in the coastal region along Chesapeake Bay, characterized as excessively to poorly drained and formed in marine or eolian sediments.
- Udorthents-Urban Lands - occurring throughout the rest of the site, characterized as well to moderately drained with a loamy substratum, and formed primarily in disturbed sediments.

2.4 Regional Hydrogeology

The hydrogeology of the Virginia Coastal Plain has been characterized by many authors. The uppermost water table aquifer, known as the Columbia Aquifer, is the primary unit of concern at the NAB Little Creek installation. The Columbia Aquifer extends from the ground surface to a depth of 20 feet below mean sea level in the Little Creek area and is underlain by the upper unit of the Yorktown Formation.

The hydrogeologic framework of the Norfolk area includes four principal aquifers, one unconfined and three confined. These aquifers and their geologic unit equivalents are:

- The unconfined water table aquifer, mostly in the Columbia Group,
- The Yorktown Aquifer, in the upper part of the Yorktown Formation,
- The Eocene-Upper Cretaceous aquifer, in the lower part of the Calvert and Mattaponi Formations, and
- The lower Cretaceous aquifer, in the Potomac Group.

Confining beds, or aquitards, between and within the aquifers retard, but do not prevent, vertical movement of groundwater. Overall, the water-bearing units comprise a leaky-aquifer system with groundwater generally flowing easterly towards the Chesapeake Bay. The lower Cretaceous Aquifer exhibits the most confinement (Siudyla, et al., 1981).

The Columbia Aquifer lies in beds and lenses of sand and some gravel, shell beds, silt, sandy clay, and clay. The major water-bearing strata, consisting of sand and shell beds and lenses, are highly heterogeneous and discontinuous due to the marine estuarine environments in which they were deposited. The sand units yield quantities adequate for domestic and small industrial demands for non-potable water. Individual well yields range from 5 to 50 gallons per minute (gpm), and specific capacities range from about 1 to 2 gallons per minute per foot (gpm/ft) (Siudyla, et al., 1981). Groundwater in coastal regions has been found to be saline (Hamilton and Larson, 1988).

Recharge for the Columbia Aquifer comes primarily through infiltration of precipitation. The IAS estimated that approximately 50 percent of the precipitation which falls in the area infiltrates, and 78 percent of the water which infiltrates reaches the water table. Regional hydraulic gradients within the water table aquifer are quite low because of the lack of topographic relief.

The Yorktown Aquifer underlies the Columbia Aquifer. Major water-bearing zones comprising the Yorktown Aquifer are found in the upper 50 to 100 feet of the Yorktown Formation. These water-bearing zones are made of beds of fine to coarse sand, gravel, and shells approximately 5 to 20 feet thick. The Yorktown Aquifer generally is separated from the overlying water table aquifer by beds of silt, clay, and sandy clay about 20 to 40 feet thick (Siudyla, et al., 1981). Groundwater in coastal regions may be saline in the lower part of the aquifer (Hamilton and Larson, 1988).

Well yield and specific capacity data for the Yorktown Aquifer are limited. Reported well yields range from 12 to 304 gpm with an average of 87 gpm. Specific capacities range from 0.5 to 14.4 gpm/ft with an average of 5 gpm/ft. Area domestic well drillers indicate that smaller diameter, 1-1/4 inch to 2 inch, well yields range from 5 to 50 gpm (Siudyla, et al., 1981).

The Eocene-Upper Cretaceous Aquifer is found at a minimum depth of 500 feet in the western section of the Norfolk area to depths of approximately 1,000 feet in the eastern section. The aquifer generally lies in one or two fine- to medium-grained glauconitic sand beds, 10 to 30 feet thick, interbedded with silt and clay (Siudyla, et al., 1981).

The Lower Cretaceous Aquifer lies in interbedded gravel, sand, silt, and clay. In most cases, it is separated from the Eocene-Upper Cretaceous Aquifer by clay and silt units 50 feet or more thick. Beds of clay divide the aquifer into several prolific zones. The top of the aquifer ranges from 600 feet below land surface in the northwestern study area to about 1,100 feet in the eastern section. The bottom of the aquifer rests on basement bedrock at a depth of 2,000 feet in the west to about 4,000 feet in the east. Well yields for this aquifer ranged from 200 to 1,000 gpm and specific capacities range from 2.9 to 30.8 gpm/ft (Siudyla, et al., 1981).

2.4.1 Surface Water

The NAB Little Creek is located adjacent to Chesapeake Bay, as shown on Figure 1-1. Based on topographic mapping of the site, most surface drainage flows into the Little Creek Tidal Inlet, which consists of Little Creek, Desert Cove, Little Creek Channel, and Little Creek Cove, and then into Chesapeake Bay through the inlet. On the eastern part of the base, surface drainage flows via unlined canals into five lakes, of which Lake Bradford and Chub Lake are the largest. These lakes do not have surface outlets into Chesapeake Bay.

Chub Lake and Lake Bradford are interconnected freshwater lakes, not directly connected with other surface water bodies. The water level in these two lakes is regulated by the release of overflow into a canal which drains to the southwest and eventually into Little Creek Cove. This canal is the subject of sampling at Site 12 as part of the RI/FS/RA. Chub Lake and Lake Bradford may receive significant amounts of salt water from the Chesapeake Bay during extreme storm events (IAS, 1984).

As described in the IAS, the NAB Little Creek is influenced by tidal fluctuations. Little Creek and Little Creek Cove experience a semidiurnal tide of approximately 2.5 feet, but because of the limited areal extent of the harbor, tidal currents are limited. Effects of the tidal fluctuations on the groundwater flow and contaminant migration at the Base are unknown.

A narrow east-west trending canal, located south of the NAB Little Creek, carries outflow from the freshwater Lake Whitehurst Reservoir and Little Creek Reservoir/Lake Smith to Little Creek Cove. The 4,000-foot long drainage canal originates from Little Creek Reservoir and passes through the western portion of Site 7, which is investigated as part of the RI/FA/RA. Lake Smith is designated as an emergency source of potable water.

2.5 Summary and Review of Existing Data

FWES's review of existing data concentrated primarily on assessing the chemical and hydrogeologic data generated during previous investigations. The focus was on site contaminants, soil contamination, areal hydrogeology, groundwater contamination, and surface water/sediment contamination.

Initial Assessment Study

The Initial Assessment Study (IAS) at NAB Little Creek was completed in December 1984 by Rogers, Golden, and Halpern, of Philadelphia, Pennsylvania. Its purpose was to identify and assess sites posing a potential threat to human health or the environment due to contamination resulting from prior hazardous waste management activities. The study entailed the collection and evaluation of archival and activity records relating to waste generation, handling and disposal, characterization of physical conditions at the site such as soil, hydrogeology, etc., and identification of migration pathways and potential receptors. The results of these data evaluation efforts were used to develop recommendations concerning the need for a Confirmation Study at a given site, the goal of which was to verify the presence of contamination and determine the need for further characterization and/or remediation.

The IAS examined 17 sites at NAB Little Creek. Six sites were recommended for Confirmation Studies, Sites 7, 9, 10, 11, 12, and 13. Of the remaining 11 sites, mitigation measures were recommended for four of the sites, Sites 4, 5, 15, and 16, and no further action was recommended for six of the sites, Sites 1, 2, 6, 8, 14, and 17. Site 3, the West Annex Fuel Spill, was addressed under a separate action to recover free-floating oil from the water table. Site 17, the Building 1256 Motor Oil Disposal Area, was added to the PSI by the Navy.

The IAS recommendations to conduct Confirmation Studies were based largely on the finding that contaminants from disposal areas may migrate toward surface water bodies with little attenuation, owing to a lack of clays and organic material, and in a relatively short time because of high hydraulic conductivities. The potentially affected surface water include Little Creek Cove, Lake Bradford, and Lake Smith. Lake Bradford and Lake Smith are used for recreational purposes, and Lake Smith serves as the back-up municipal water supply for the Norfolk-Virginia Beach area. Delineation of an actual threat or risk was not possible due to the lack of site-specific hydrogeologic and groundwater quality data.

The IAS presented a number of detailed recommendations concerning the installation and sampling of monitoring wells, the sampling of surface soil, surface water and sediment, and the types of laboratory analyses to be completed. The recommendations also addressed well completion depths and water level monitoring requirements. Many of the recommendations were aimed at resolving the data gaps identified in the IAS. These recommendations, with slight changes, became the Scope of Work for the Round 1 Verification Step (RVS). Because the IAS recommended only mitigation measures for Sites 5 and 16, they were not included in the RVS' Scope of Work. These two sites were studied during the PSI.

Preliminary Site Inspection

A PSI was prepared to assess the threat to human health and the environment from five sites at NAB Little Creek. Sites 5 and 16 were included in these inspections. Chemical constituents of concern were detected in the groundwater at Site 5 and further sampling was recommended. At Site 16, elevated levels of PCBs were detected and additional sampling was recommended to delineate contamination. Remediation was also recommended for Site 16.

2.5.1 Site 5 - Buildings 9 and 11, Motor Oil Disposal Area

Initial Assessment Study

The IAS did not recommend Site 5 for a confirmation study. At the time of the study, 1,230 gallons per year of oil and antifreeze were known to have been used by this activity. The IAS estimated that up to 50,000 gallons of oil and antifreeze may have been disposed through the Marsden matting which formerly covered the area between Buildings T-9 and T-11. Although the site was not recommended for a confirmation study, mitigative measures to clean up the site were recommended.

From 1969 to 1981, grate-covered pits were used in Building 11 for the disposal of motor oil, solvents, and antifreeze. In the December 1984 IAS, the IAS estimated that 43,000 gallons of these materials may have been disposed in this manner. However, it is quite likely that lesser amounts were disposed, based on the size of the pits and the amount of observed materials in them. Waste disposed in the pits would have been trapped by their concrete lining. Appendix J contains an excerpt from an as-built drawing of Building 11. It has been observed by Naval personnel that the water level in the pits has risen over the years, indicating a high degree of integrity.

Preliminary Site Inspection Report

The field program conducted at Site 5 included the installation and sampling of three monitoring wells. Three groundwater and eight surface soil samples were collected. The surface soil samples were screened in the field using an HNu. Of the eight soil samples collected, four were sent for laboratory analysis. The monitoring well and surface soil sampling locations are shown on Figure 2-3. The results of sampling are provided in Table 2-1.

One VOC, 1,1-dichloroethane at a level of 23.2 ug/L, was detected in one groundwater sample, LC5-GW02, and none of the soil samples. TPH was not detected in the groundwater samples. TPH was detected in the soil samples at levels ranging from 73.3 mg/kg to 94.0 mg/kg. Lead was detected in all three groundwater samples at levels ranging from 9.2 ug/l to 24 ug/l, and in all four soil samples at levels ranging from 1.8 mg/kg to 8.6 mg/kg.

The PSI put forth the following recommendations: It was suggested that another round of samples be collected from the three monitoring wells. Filtered groundwater samples should be collected from wells LC5-GW02 and LC5-GW03 and analyzed for lead. If the sampling confirms the presence of 1,1-

TABLE 2-1

SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
 SITE 5: BUILDING 9 - 11 MOTOR OIL DISPOSAL AREA
 NAB LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 PRELIMINARY SITE INSPECTION
 JULY 1991

PARAMETER	5-GW01	5-GW02	5-GW03
VOLATILE ORGANIC COMPOUNDS (ug/l)			
1,1-DICHLOROETHANE		23.2	
TOTAL PETROLEUM HYDROCARBONS (mg/l)			
METALS (ug/l)			
LEAD	9.2	24	15

NOTES:

All results in units specified

Blank indicates compound was not detected

SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES
 SITE 5: BUILDING 9 - 11 MOTOR OIL DISPOSAL AREA
 NAB LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 PRELIMINARY SITE INSPECTION
 JULY 1991

PARAMETER	5-SS04	5-SS06	5-SS07	5-SS08
VOLATILE ORGANIC COMPOUNDS (ug/l)				
TOTAL PETROLEUM HYDROCARBONS (mg/kg)	73.3	89.9	89.3	94.0
METALS (mg/kg)				
LEAD	4.1	8.6	1.8	4.3

NOTES:

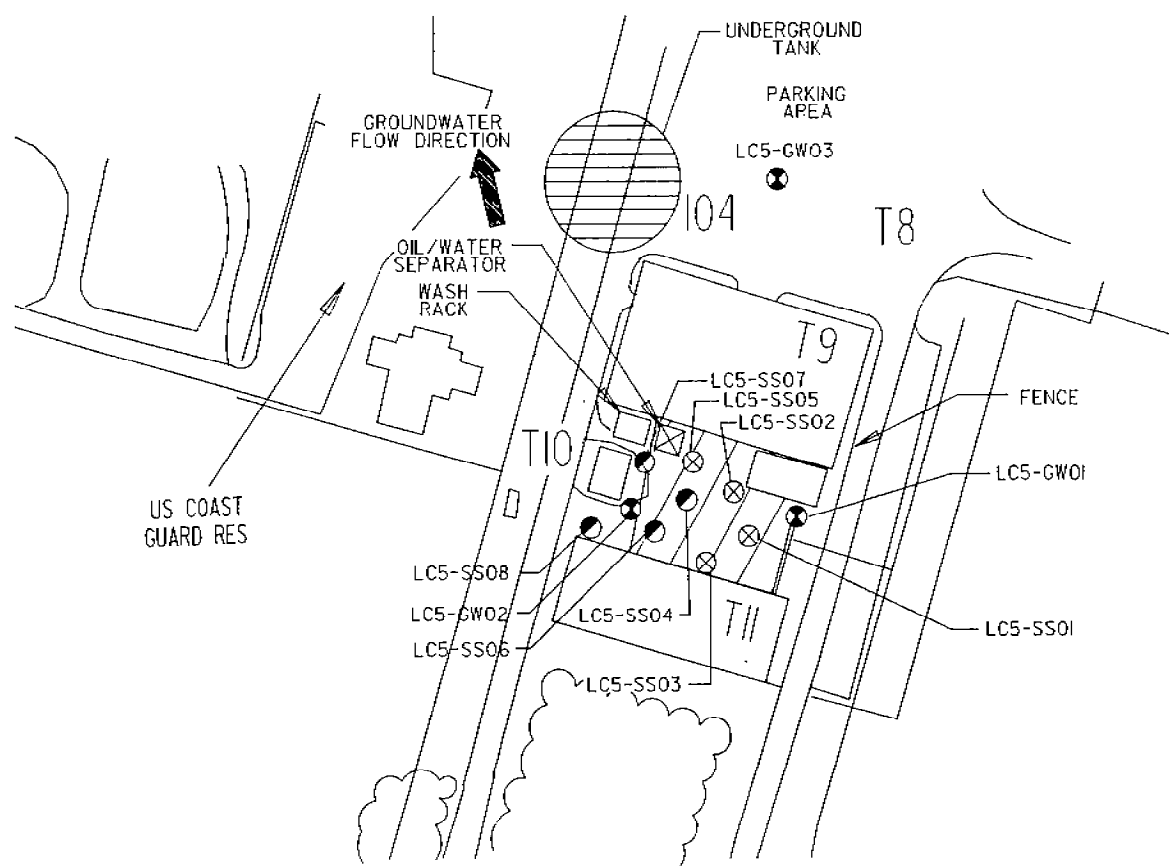
All results in units specified

Blank indicates compound was not detected





TABLE 2-2

SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES
SITE 16: PCB CAPACITOR SPILL, POLE NO. 425
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA
PRELIMINARY SITE INSPECTION
JULY 1991

PARAMETER	16-SS01	16-SS02	16-SS03	16-SS04
PCBs (ug/kg)				
AROCOR 1242	14,000	15,000	750,000	810,000



LEGEND

-  MARSDEN MATTING
-  SAMPLE RETAINED FOR ANALYSIS
-  SAMPLE COLLECTED BUT NOT RETAINED
-  MONITORING WELL

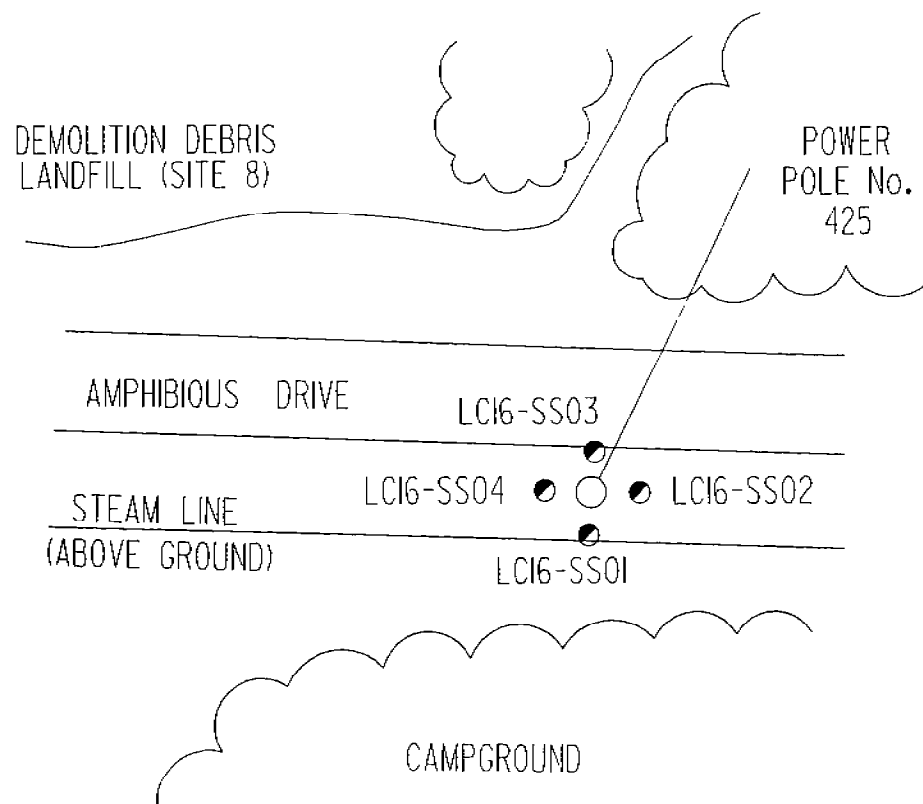
SOURCE: PRELIMINARY SITE INSPECTION REPORT, EBASCO, 7/91



FIGURE 2-3
PREVIOUS SAMPLING LOCATIONS
SITE 5
PRELIMINARY SITE INSPECTION
NAB - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

This Drawing is the Property of the
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8 PEACH TREE HILL ROAD, DUNSTON, VA
AND IS LOANED WITHOUT COMPENSATION OTHER THAN THE
BORROWER'S AGREEMENT THAT IT SHALL NOT BE RE-
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THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.

FW
DRAWN BY: JAW
CHECKED BY: JAW
DATE: 05-25-91
PROJECT: 102013-1-41-101-10



LEGEND

- SURFACE SOIL SAMPLING LOCATION



SOURCE: PRELIMINARY SITE INSPECTION REPORT, EBASCO, 7/91

FIGURE 2-4
PREVIOUS SAMPLING LOCATIONS
SITE 16
PRELIMINARY SITE INSPECTION
NAB - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA



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BY 10001.DWG

dichloroethane, the soil beneath Building 10 should be sampled to determine if the building is the source. Samples also should be collected of the fluid and sediment in the cable trench to determine if the trench is the source of the groundwater contamination. If the presence of the groundwater contamination is verified, an additional monitoring well should be installed directly downgradient of well LC5-GW02 to determine the extent.

2.5.2 Site 16 - PCB Capacitor Spill, Pole No. 425

Initial Assessment Study

The IAS did not recommend a confirmation study at this site. The damage occurred during a thunderstorm in the early 1980s. Under Navy's initiative, approximately one inch of topsoil was removed from around the base of the pole immediately after the incident. A soil sample taken from this site after the incident and shallow excavation revealed a PCB concentration of 1,000 mg/l.

Preliminary Site Inspection

A total of four soil samples were collected at Site 16. The sampling locations are shown on Figure 2-4. The results of the sampling are provided in Table 2-2.

Detectable concentrations were present at all four sampling locations. Higher concentrations of Aroclor 1242, 750,000 ug/kg at 16-SS03 and 810,000 ug/kg for one of two samples collected at 16-SS04, were located to the north and west of Pole No. 425.

The PSI recommended the area be fenced and labelled as contaminated. Sampling of both surface and subsurface soils should be conducted to define the areal and vertical extent of the PCB contamination. The PSI also recommended the contaminated soil be removed, using the most stringent clean-up level as a guideline due to the proximity of the campground, and placed in a TSCA-approved landfill.

3.0 FIELD INVESTIGATION

The field investigation and sampling activities were conducted at Sites 5 and 16 from May 11, 1993 through July 1, 1993. Surface soil and groundwater samples were collected for chemical analysis. All analytical samples were shipped via Federal Express to Ceimic Corporation's laboratory in Narragansett, Rhode Island, for analysis. All monitoring well installations were performed by McCallum, Inc. of Chesapeake, Virginia. The following sections provide the methodologies used to characterize each site at NAB Little Creek.

3.1 Site 5 - Buildings 9 and 11, Motor Oil Disposal Area

Site 5 consists of the area between Buildings 9 and 11 and measures approximately 100 feet by 150 feet in area. Field activities at this site included monitoring well installation, groundwater sampling, soil sampling, and water level measurements. Table 3-1 provides a sampling summary for Site 5. Figure 3-1 presents a site map with sample locations for Site 5.

3.1.1 Monitoring Well Installation

One monitoring well, LC5-GW04, was installed at Site 5 to monitor the quality of groundwater migrating away from the site. Continuous split-spoon soil samples were obtained using standard penetration tests following ASTM D 1586 Guidelines. This method was conducted using a 2-foot long, 2-inch ID split spoon sampler. Soil samples were visually classified by the on-site FWES geologist and descriptions were recorded on a Soil Boring Log. The soil classification is based on the Unified Soil Classification System (USCS). Other relevant information, such as evidence of contamination, moisture content, and blow counts, was recorded on the Soil Boring Log. Appendix B provides the Soil Boring Log for Site 5. Boring logs for wells installed during the PSI are not available.

The monitoring well was constructed of 4-inch ID Schedule 40, flush-joint and threaded PVC casing, with a 10-foot long section of 0.010-inch slotted screen. A medium-grain sand pack extended from below the screen to a minimum of 1 foot above the top of the screen. Bentonite pellets were placed above the sand pack and hydrated with potable water. A flush-mounted 12" cover and a PVC locking cap were fitted at the top of the monitoring well. The monitoring well was fitted a 3-foot square concrete pad for protection for vehicular traffic. Appendix C provides a detailed description and diagram of the monitoring wells installed at Site 5.

Following well construction activities, the monitoring well was developed, using a centrifugal pump, until the groundwater was essentially sediment-free. The well was developed by pumping at a rate of approximately one gallon per minute. The water recovered was containerized in 55-gallon steel drums. The drums were stored at the monitoring well for use during the groundwater sampling. Subsequently, the drums were sealed, labelled, and left at the site pending further action by NAB Little Creek.

3.1.2 Groundwater Samples

Groundwater samples were collected from the three existing and one new monitoring wells at Site 5 to determine the nature and extent of any VOCs or dissolved lead in the groundwater beneath the site. Prior to sampling, a minimum of three well casing volumes was purged from each well by hand bailing. Purged water was containerized in 55-gallon steel drums and later stored in a centralized location for future disposal. Groundwater samples were collected from the wells using disposable polyethylene bottom loading bailers. The samples were transferred into laboratory prepared sample containers by pouring water from the bailer into the appropriate sample containers, slowly to minimize volatilization, and immediately stored on ice. One round of samples was collected from each well and the samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), total calcium, lead, and magnesium, dissolved lead, alkalinity, bicarbonate, and pH. The temperature, pH, and conductivity of the groundwater samples were measured in the field using a pH-temperature-conductivity meter and recorded in the field logbook. Appendix G provides the chain-of-custody documentation that accompanied the groundwater samples.

3.1.3 Surface Soil Samples

Four surface soil samples were collected at Site 5 around the perimeter of the concrete spill pad. Surface soil sampling was conducted to verify whether Building 10 is the source of the constituents of concern. The soil samples were collected at depths ranging from 0 to 6 inches. The area to be sampled was first cleared of any grass, twigs, or stones. A stainless steel spoon was used to place the sample directly into a pre-cleaned sample container supplied by the laboratory. The surface soil samples were analyzed for TCL VOCs and total organic carbon (TOC). Appendix E provides descriptions of the surface soil samples, and Appendix G provides the chain-of-custody documentation for the surface soil samples.

3.1.4 Survey

All new and existing groundwater monitoring wells and surface soil sample locations were surveyed by Hoggard-Eure of Portsmouth, Virginia. Elevations of the top of casing and concrete well pad were surveyed for each monitoring well.

3.2 Site 16 - PCB Capacitor Spill, Pole No. 425

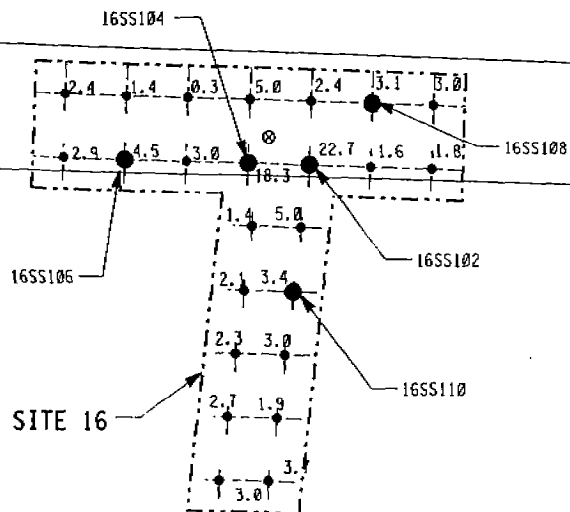
Site 16 is the area of the PCB capacitor spill around Pole No. 425. Field activities at this site included field screening, surface soil sampling, and surveying. Table 3-2 provides a sampling summary for Site 16. Figures 3-2 and 3-3 present a site map with sample locations for Site 16.



DEMOLITION DEBRIS
LANDFILL (SITE 8)

AMPHIBIOUS DRIVE

STEAM LINE
(ABOVE GROUND)




CAMPGROUND

NOTES:

1. EACH GRID EQUALS APPROX. 10'-0"

LEGEND

- SITE BOUNDARY
- FIELD SCREENING SAMPLES USING DEXSIL L-2000
- 22.7 FIELD SCREENING SAMPLES USING DEXSIL AND SENT TO LAB.
- 16SS102 IDENTIFICATION NUMBER FOR THE SAMPLE SUBMITTED TO THE LABORATORY.
- 4.4 RESULTS OF FIELD SCREENING (IN ppm)

A	18-29-93	DRAFT TO LANDIY	
REV.	DATE	DESCRIPTION	APPR.
REVISIONS			
FIGURE 3-3			
SAMPLING LOCATIONS SAMPLE DEPTHS OF 6"-12" SITE 16 NAB - LITTLE CREEK VIRGINIA BEACH, VIRGINIA			
 This Drawing is the property of the FOSTER WHEELER ENVIRONMENTAL SERVICES LIVINGSTON, NEW JERSEY AND IS LOANED WITHOUT CONSIDERATION OTHER THAN THE BORROWER'S AGREEMENT THAT IT SHALL NOT BE RE- PRODUCED, COPIED, LENT, OR DISPOSED OF DIRECTLY OR INDIRECTLY FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.			
DRAWN BY:	SAN	07/19/93	SCALE: GRID
CHECKED BY:			DRAWING No.
APPROVED BY:			192071-4-48-1602 A

FWES04.REF

esd167010: 11581602.dgn

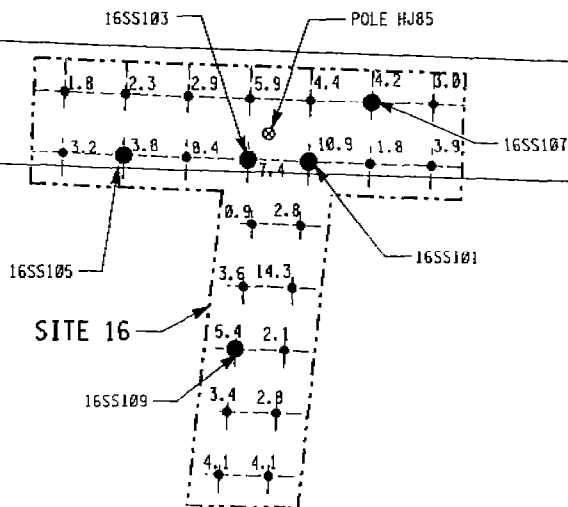
20
28-00-20
12-00-20



DEMOLITION DEBRIS
LANDFILL (SITE 8)

AMPHIBIOUS DRIVE

STEAM LINE
(ABOVE GROUND)



CAMPGROUND

NOTES:

1. EACH GRID EQUALS APPROX. 10' - 0"

LEGEND

- SITE BOUNDARY
- FIELD SCREENING SAMPLES
USING DEXSIL L-2000
- 10.9 • FIELD SCREENING SAMPLES
USING DEXSIL AND SENT TO LAB.
- 16SS101 IDENTIFICATION NUMBER FOR THE
SAMPLE SUBMITTED TO THE
LABORATORY.
- 4.4 RESULTS OF FIELD SCREENING
(IN ppm)

REV.	DATE	DESCRIPTION	APPR.
A	10-29-93	DRAFT TO LANDFILL	
REVISIONS			
FIGURE 3-2			
SAMPLING LOCATIONS SAMPLE DEPTHS OF 0"-6" SITE 16 NAB - LITTLE CREEK VIRGINIA BEACH, VIRGINIA			
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DRAWN BY: SAW		DATE: 10/19/93	SCALE: GRID
CHECKED BY:		DRAWING NO.	REV. A
APPROVED BY:		192071-4-48-1601	

NO
REV
02 28-OCT-93

FWS04.REP

aed1c7010-715R1601.dgn

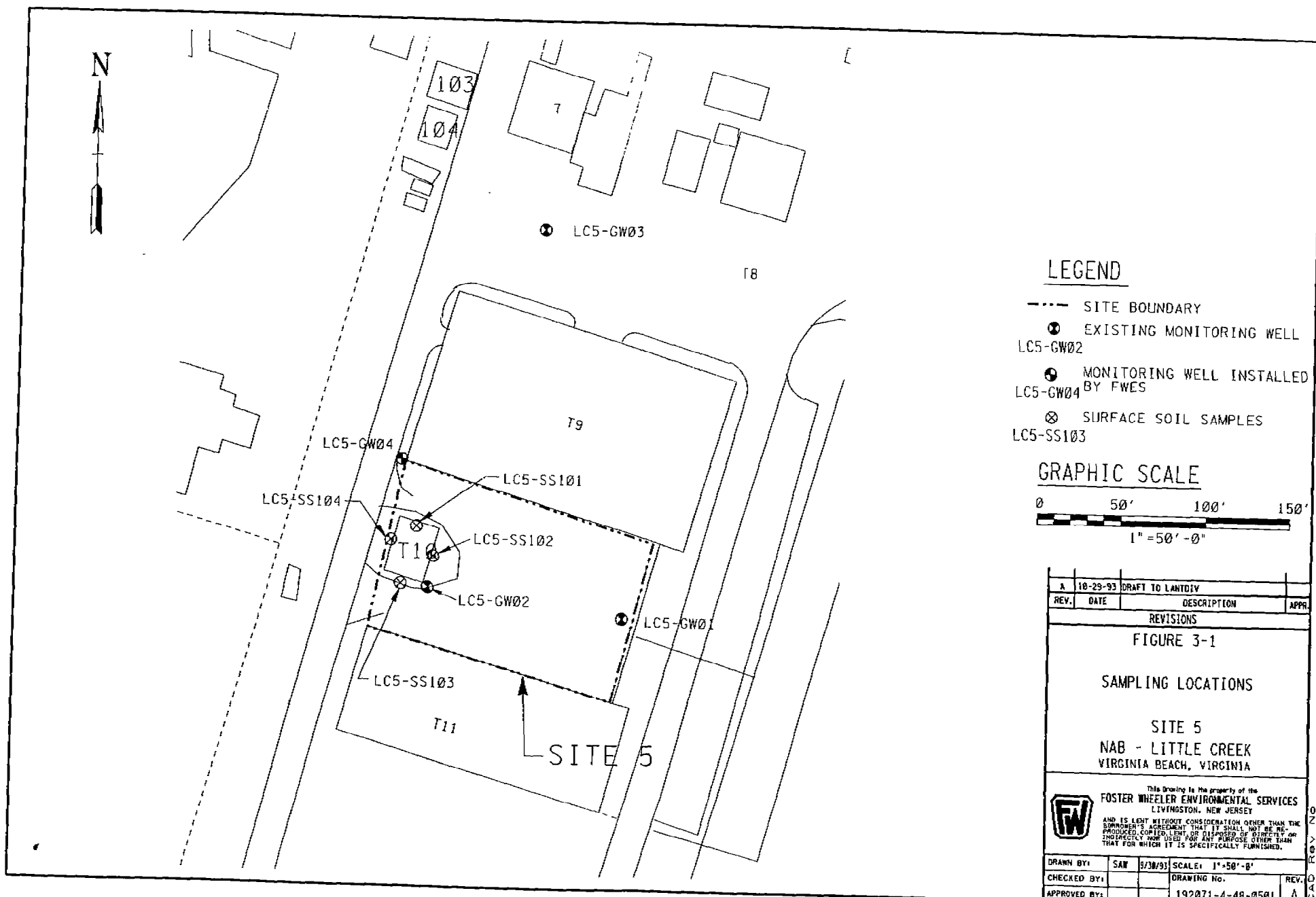


TABLE 3-1

SAMPLING SUMMARY
SITE 5 – BUILDINGS 9 AND 11, MOTOR OIL DISPOSAL AREA
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

MEDIA	SAMPLE DESIGNATION	SAMPLE LOCATION	TOTAL NUMBER OF SAMPLES PER MEDIA	LABORATORY ANALYSIS
SURFACE SOIL	05SS-101 05SS-102 05SS-103 05SS-104	05SS-101 05SS-102 05SS-103 05SS-104	4	TCL VOCs TOC
GROUNDWATER	05GW-101 05GW-102 05GW-103 05GW-104	LC5-GW01 LC5-GW02 LC5-GW03 LC5-GW04	4	TCL VOCs TAL Metals Total Pb, Ca, Mg Dissolved Lead Alkalinity Bicarbonate pH

NOTES:

- 1) TCL VOCs indicates Volatile Organic Compounds
- 2) TAL analysis for water samples can be either filtered to determine dissolved metal content or unfiltered to determine total metal content. Analysis is noted as either dissolved or total.
- 3) TOC indicates Total Organic Carbon

TABLE 3-2

SAMPLING SUMMARY
SITE 16 - PCB CAPACITOR SPILL, POLE NO. 425
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

MEDIA	SAMPLE DESIGNATION	SAMPLE LOCATION	TOTAL NUMBER OF SAMPLES PER MEDIA	LABORATORY ANALYSIS
SURFACE SOIL SCREENING	16SSS-101	16SSS-101	48	PCB Field Analysis Using the Dexsil L2000
	16SSS-101D	16SSS-101D		
	16SSS-102	16SSS-102		
	16SSS-102D	16SSS-102D		
	16SSS-103	16SSS-103		
	16SSS-103D	16SSS-103D		
	16SSS-104	16SSS-104		
	16SSS-104D	16SSS-104D		
	16SSS-105	16SSS-105		
	16SSS-105D	16SSS-105D		
	16SSS-106	16SSS-106		
	16SSS-106D	16SSS-106D		
	16SSS-107	16SSS-107		
	16SSS-107D	16SSS-107D		
	16SSS-108	16SSS-108		
	16SSS-108D	16SSS-108D		
	16SSS-109	16SSS-109		
	16SSS-109D	16SSS-109D		
	16SSS-110	16SSS-110		
	16SSS-110D	16SSS-110D		
	16SSS-111	16SSS-111		
	16SSS-111D	16SSS-111D		
	16SSS-112	16SSS-112		
	16SSS-112D	16SSS-112D		
	16SSS-113	16SSS-113		
	16SSS-113D	16SSS-113D		
	16SSS-114	16SSS-114		
	16SSS-114D	16SSS-114D		
	16SSS-115	16SSS-115		
	16SSS-115D	16SSS-115D		
	16SSS-116	16SSS-116		
	16SSS-116D	16SSS-116D		
	16SSS-117	16SSS-117		
	16SSS-117D	16SSS-117D		
	16SSS-118	16SSS-118		
	16SSS-118D	16SSS-118D		
	16SSS-119	16SSS-119		
	16SSS-119D	16SSS-119D		
	16SSS-120	16SSS-120		
	16SSS-120D	16SSS-120D		
	16SSS-121	16SSS-121		
	16SSS-121D	16SSS-121D		
	16SSS-122	16SSS-122		
	16SSS-122D	16SSS-122D		
	16SSS-123	16SSS-123		
	16SSS-123D	16SSS-123D		
	16SSS-124	16SSS-124		
	16SSS-124D	16SSS-124D		
SURFACE SOIL	16SS-101	16SS-101	10	PCBs TOC
	16SS-102	16SS-102		
	16SS-103	16SS-103		
	16SS-104	16SS-104		
	16SS-105	16SS-105		
	16SS-106	16SS-106		
	16SS-107	16SS-107		
	16SS-108	16SS-108		
	16SS-109	16SS-109		
	16SS-110	16SS-110		

NOTES:

- 1) TCL PCBs indicates Polychlorinated Biphenyls
- 2) TOC indicates Total Organic Carbon
- 3) D indicates a soil sample from a deeper depth, 6" to 12" as compared to 0" to 6".

3.2.1 Field Screening with the Dexsil L2000

To completely delineate PCB contamination in soil, a large number of samples need to be collected for laboratory analysis. In order to maximize the information obtained from a limited number of soil samples collected for PCB laboratory analysis, PCB field screening was performed using Dexsil L2000 PCB/Chloride Analyzer. The field screening was employed to: a) aid in selection of sampling locations for soil PCB analysis by the laboratory, b) provide immediate results, c) delineate soils containing high PCB concentrations in the vicinity of Pole No. 425.

The Dexsil system consists of laboratory prepared extraction solvents and reagents, measuring vials and pipettes, a chloride ion detector, and an electrically powered digital control box. Field screening for PCBs using the Dexsil system involves a series of chemical reactions which extracts organic chloride from the soil and fixes the chloride as an inorganic salt. The Dexsil L2000 PCB/Chloride Analyzer uses a chloride specific electrode to measure the total organic chloride content in the soil sample. The instrument provides a direct readout, in parts per million (ppm), of total chloride. A selector dial on the instruments also provides a direct readout of total chloride as equivalent PCB.

Forty-eight surface soil samples were collected for field screening. The soil samples were collected from twenty-four grid nodes shown on Figures 3-2 and 3-3 at depth intervals of 0-6 inches and 6-12 inches. Due to the proximity to utilities soil samples did not exceed 12 inches. The grid nodes were determined using a 10 foot by 10 foot grid system.

Soil samples were prepared by using a known volume of soil reacting with provided reagents to extract organic chloride from the sample. The resultant solution containing the extracted chloride ions is analyzed by the chloride ion detector. The chloride ion detector, which is connected to the control box, is immersed into the extract solution, and a digital readout in ppm produced. Selecting different settings provide direct readout as equivalent PCB in ppm based on the total chloride measured.

The system is susceptible to false positive readings for PCBs due to other organic chlorine containing compounds which may be present in the soil. For this reason, the screening is used to delineate the maximum possible area of PCB contamination.

3.2.2 Surface Soil Samples

Ten surface soil samples were collected at Site 16 from areas identified during the field screening as "hot spots." The number of soil samples was equally divided between depths ranging from 0 to 6 inches and 6 to 12 inches. The area to be sampled was first cleared of any grass, twigs, or stones. A stainless steel spoon was used to place the sample directly into a pre-cleaned sample container supplied by the laboratory. The surface soil samples were analyzed for PCBs and TOC. Appendix E provides descriptions of the surface soil samples and Appendix G provides the chain-of-custody documentation for the surface soil samples.

3.2.3 Survey

All sample locations were surveyed by Hoggard-Eure of Portsmouth, Virginia.

4.0 PHYSICAL CHARACTERISTICS

Physical data obtained during the field program have been used to characterize each site under investigation. Results from the field program are presented below by site.

4.1 Site 5 - Buildings 9-11 Motor Oil Disposal Area

Data collected during this investigation were used to characterize Site 5. Previous investigations of the site include the IAS and PSI. Data from these studies are used whenever applicable. Results of the physical characterization are presented below.

4.1.1 Site Topography, Drainage, and Surface Features

Site 5 encompasses an area of approximately 15,000 square feet to the south of Building 9 and measures approximately 100 feet by 150 feet. The location of Site 5 is presented on Figure 2-1.

Site 5 is located in a heavily used light-industrial area. The site is bordered to the north by Building 9, to the east by a storage area, and to the south by a grassy area, the former location of Building 11 and now used as a staging area for storage containers. To the west is a small road and a grassy area. A Coast Guard station lies to the west of the grassy area. The site lies within a restricted area and access is gained through a guarded gate. Site 5 is relatively level with an elevation of approximately 10.0 feet above mean sea level (msl). Surveyed ground elevations range from 9.7 feet above msl at monitoring well LC5-GW4 to 10.4 feet above msl at Monitoring Well LC5-GW2. Monitoring Well LC5-GW3 is approximately 150 feet north of the site and has a ground elevation of 8.53 feet above msl.

A concrete pad lies at the western edge of the site at the former location of Building T-10, and measures approximately 10 feet by 10 feet. The rest of the site consists mainly of grass or dirt/gravel covered areas. The site is active with a moderate amount of pedestrian and truck traffic related to storage containers frequently located on the grassy area.

Surface water is controlled on the paved areas adjacent to the site by a system of storm sewers. During a rain event experienced while on-site, it was observed that most surface water on the grassy areas either ponded or infiltrated the ground surface. A small volume of surface water was observed draining off towards the paved areas on the west edge of the site. Approximately 300 feet north of the site is a pier area on Little Creek Cove. This area is active with small boat traffic.

Vegetation is limited to grassy areas and wooded areas to the east, south, and west of the site. There are some areas which are devoid of grass due to vehicle activity.

4.1.2 Geology

Drilling activities permitted observation of the thickness and extent of undisturbed natural material and depth to water. One monitoring well, LC5-GW4, was installed on the site during this investigation. A

geologic log was prepared for the monitoring well boring drilled during this investigation and is presented in Appendix B. The boring logs for the three preexisting wells on-site were not available for comparison.

The top five inches of the boring for monitoring well LC5-GW4 consisted of gravel fill. The next 6.5 feet consisted of sand. At a depth of seven feet below ground surface (bgs), clay was encountered. This clay layer was eight feet thick and was followed by another sand layer. This sand layer is of undetermined thickness as the boring for monitoring well LC5-GW4 ended at a depth of 16 feet bgs.

4.1.3 Stratigraphy

Because only one boring log was available, the construction of a cross-section was not practical. From the literature, the undisturbed natural soil and sediment underlying the site can be classified as that of the Columbia Group.

4.1.4 Hydrogeology

Groundwater beneath the site is located in undisturbed natural soils and sediment. Primary porosity consists of intergranular voids. All monitoring wells on Site 5 were installed within the shallow water table aquifer. During this investigation, the following were established:

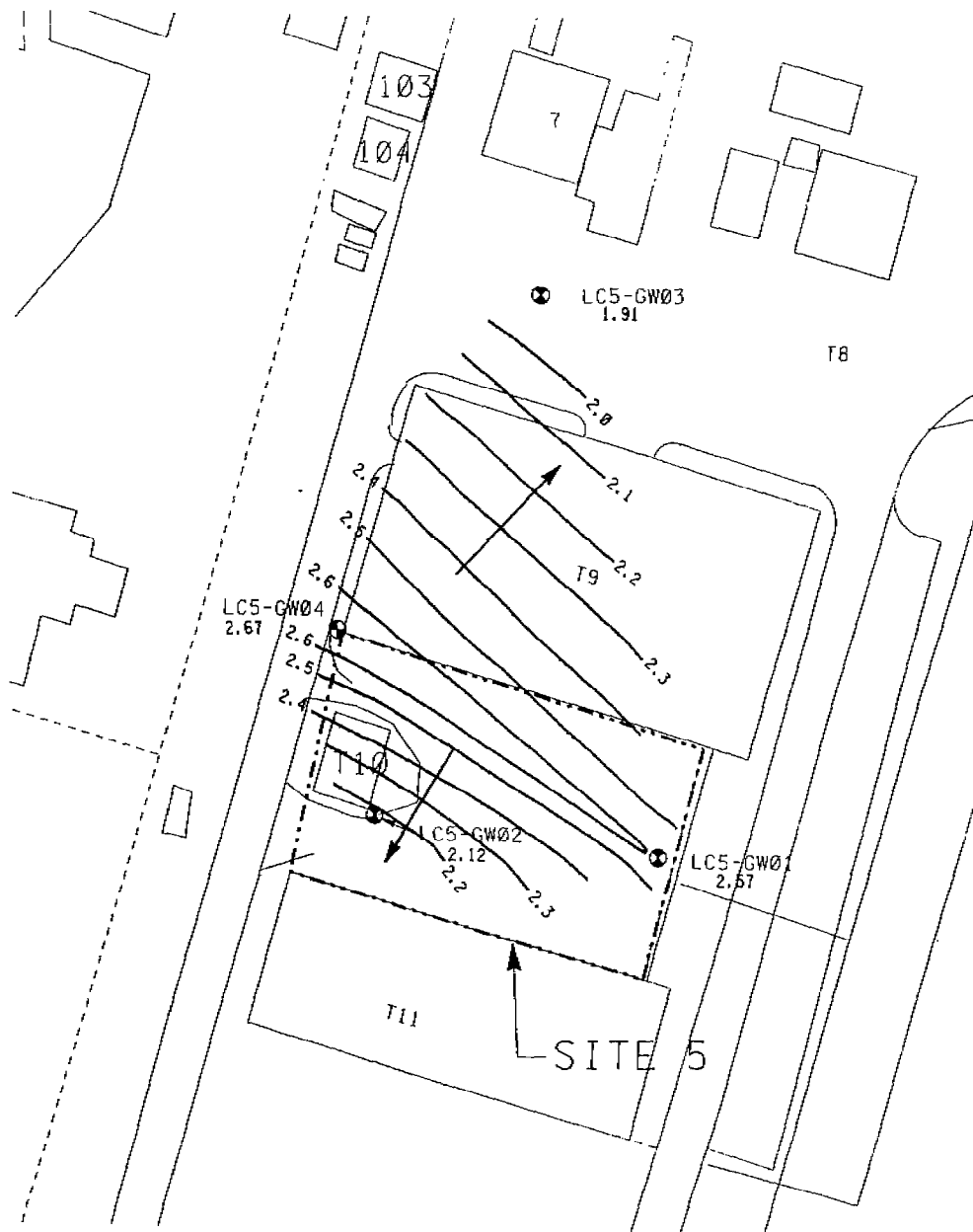
- Depth to groundwater,
- Groundwater flow patterns, and
- Groundwater hydraulic gradients.

4.1.4.1 Water Level Data

Depth to water was measured in each monitoring well at synoptic intervals. Depth to water and water surface elevation data are summarized in Table 4-1.

The monitoring well installed at Site 5, as well as the three pre-existing wells, screen the water table aquifer. The water levels taken on June 29, 1993 are utilized for the groundwater contours of the water table aquifer presented on Figure 4-1. Groundwater elevations range from 2.67 feet above msl in Monitoring Well LC5-GW4 to 1.91 feet above msl in Monitoring Well LC5-GW3. The average hydraulic gradient calculated from the water level data obtained on June 29, 1993 for the site is 4.81×10^{-3} feet/foot. This appears to be a groundwater drainage divide trending northwest-southeast across the site. Groundwater flow is to the north-northeast towards Little Creek Cove and to the south-southwest from the drainage divide.

Two rounds of water levels were taken at Site 5. In addition to the water levels taken on June 29, 1993 (Round 2) discussed above, another round was taken on May 14, 1993 (Round 1). Based on monitoring well construction data the measured depths to water were below the tops of the well screens at the time the water level data were collected. The water levels from Round 1 were significantly higher than those taken in Round 2. The differences ranged from 1.61 feet in monitoring well LC5-GW1 to 0.74 feet in



LEGEND

● EXISTING GROUNDWATER MONITORING WELL LOCATIONS WITH GROUNDWATER ELEVATION.

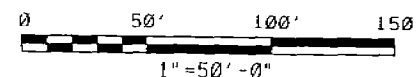
● MONITORING WELL INSTALLED BY FWES WITH GROUNDWATER ELEVATION.

--- SITE BOUNDARY

— 2.3 LINES OF EQUAL GROUNDWATER ELEVATION

→ GROUNDWATER FLOW DIRECTION

GRAPHIC SCALE



A	10-29-93	DRAFT TO LANDIV	
REV.	DATE	DESCRIPTION	APPR.
REVISIONS			
FIGURE 4-1			
GROUNDWATER CONTOUR MAP			
JUNE 29, 1993			
SITE 5			
NAB - LITTLE CREEK			
VIRGINIA BEACH, VIRGINIA			
<small>This drawing is the property of the FOSTER WHEELER ENVIRONMENTAL SERVICES LIVINGSTON, NEW JERSEY AND IS LOANED WITHOUT CONSIDERATION OTHER THAN THE BORROWER'S AGREEMENT THAT IT SHALL NOT BE RE- PRODUCED, COPIED, LENT, OR DISPOSED OF DIRECTLY OR INDIRECTLY FOR USE FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.</small>			
DRAWN BY:	SAW	10/18/93	SCALE: 1"=50'-0"
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APPROVED BY:			192071-4-48-0530
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TABLE 4-1
GROUNDWATER ELEVATIONS
ABOVE MSL
SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
NAVAL AMPHIBIOUS BASE - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

MONITORING WELL NUMBER	DATE MEASURED	MEASURING POINT ABOVE MSL (FT)	DEPTH TO WATER (FT)	WATER LEVEL ABOVE MSL (FT)
LC5-GW1	5/14/93	12.78	8.60	4.18
	6/29/93		10.21	2.57
LC5-GW2	5/14/93	13.29	10.43	2.86
	6/29/93		11.17	2.12
LC5-GW3	5/14/93	8.07	5.40	2.67
	6/29/93		6.16	1.91
LC5-GW4	5/14/93	9.40	5.94	3.46
	6/29/93		6.73	2.67

NOTES:

MSL indicates Mean Sea Level

monitoring well LC5-GW3. In the time between the two rounds of water levels, a total of 5.66 inches of rain fell in the Norfolk area. This is almost two inches below the normal precipitation total for this time period. Thus, the rise in water levels in the monitoring wells cannot be attributed to precipitation.

Site 5 lies almost adjacent to Little Creek Cove. Due to its proximity to this tidally active body of water, rises and falls in groundwater levels related to tidal changes can be expected. It seems likely that the rise in groundwater levels found in the monitoring wells is a result of tidal fluctuations.

4.2 Site 16 - PCB Capacitor Spill, Pole No. 425

Data collected during this investigation were used to characterize Site 16. Previous investigations of the site consist of IAS (1984) and PSI (1991). Data from these studies were used whenever applicable. Results of the physical characterization are presented below.

4.2.1 Site Topography, Drainage, and Surface Features

Site 16 encompasses the area immediately surrounding capacitor pole No. 425. The capacitor on top of pole No. 425 was struck by lightning in the early 1980's. A sand fence surrounds the site to prevent access. The area of concern is approximately 3,600 square feet in size. It is a T-shaped area with the head of the T being 60 feet in length and 30 feet in width, and the foot being 50 feet in length and 20 feet in width. The location of Site 16 is presented on Figure 2-2.

Site 16 is located adjacent to the NAB Little Creek Campground. The site is bordered to the north by Amphibious Drive, and to the east, south, and west by the campground. The site is relatively level with an elevation of approximately 10.1 feet above msl. Surveyed ground elevations range from 9.8 feet above msl at the southwestern and southeastern edge to 10.4 feet above msl at the northwest edge of the fenced area. These locations are presented in Figures 3-2 and 3-3.

The entire site is grass or weed covered, and the area around the site is wooded. Any surface water that would be present on the site would mostly likely infiltrate into the ground. There is little or no grade on the site to assist the run-off.

4.2.2 Geology

No drilling has ever been conducted at Site 16. Ten surface soil samples were taken at the site and their locations are presented in Figures 3-2 and 3-3. Descriptions of the surface soil samples can be found in Appendix E. Generally, the surface soil at the site is a sandy, silty loam with a large amount of organic material, such as roots and rotten leaves.

4.3 Climatological Data

Climatological data collected by NOAA at the Norfolk Airport is presented in Appendix F. The precipitation and temperature data are presented daily for the months of May, June, and July 1993 which corresponds to the field program. Precipitation for the months of May, June and July 1993 was 0.93, 1.03, and 4.70 inches less than the normal precipitation for the time periods.

5.0 NATURE AND EXTENT OF CONSTITUENTS OF CONCERN

Soil and water samples were collected from SI sites at NAB Little Creek to characterize the natural chemical composition of these sites and constituents of concern. The samples were analyzed by Ceimic Laboratories at Narragansett, Rhode Island, and the results were validated by Heartland Environmental Services of St. Peters, Missouri. The data was evaluated by FWES and the evaluation is presented in Section 5.2. The Data Validation Report is included in Appendix H.

Our discussion of the chemical findings has been divided by the media investigated for each site: surface soil and groundwater. Subsurface soil, surface water, and sediment were not investigated. Data will be presented in three groupings: volatile organic compounds (VOCs), pesticides and polychlorinated biphenyls (PCBs), and Total Organic Carbon (TOC), since semi-volatile organic compounds (SVOCs) were not analyzed at any of the site. The TAL parameters represent inorganic constituents of concern, including 23 metals and cyanide; only a few metals were analyzed during the SI. In addition, total alkalinity, bicarbonate alkalinity, and pH were analyzed for water samples; this group is hereafter called as inorganic analytes.

5.1 Summary of Analytical Results

5.1.1 Site 5 - Buildings 9-11 Motor Oil Disposal Area

Surface Soil Four surface soils were collected from 0 - 6 inches below ground surface around the concrete pad which was the foundation of Building T-10. These samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), and total organic carbon.

VOCs were not detected at any of the four surface soil locations at Site 5. Volatile organic tentatively identified compounds (TICs) were detected only at 05-SS-101 at a total estimated concentration of 6 $\mu\text{g/kg}$. Table 5-1 presents a summary of VOCs detected in surface soil at Site 5.

TOC was detected at all four surface soil sampling locations. Concentrations of TOC were detected at concentrations ranging from 9,520 mg/kg at 05-SS-104 to 34,900 mg/kg at 05-SS-102. Table 5-2 presents a summary of TOC detected in surface soil samples at Site 5.

Groundwater Four groundwater samples and one duplicate were collected from four groundwater monitoring wells at Site 5. Based on monitoring well construction data the measured depths to water were below the tops of the well screens at the time the groundwater samples were collected. These samples were analyzed for TCL VOCs, total calcium, lead, and magnesium, dissolved lead, and inorganic analytes.

VOCs were detected at two of the groundwater sampling locations. 1,1-Dichloroethane (DCA) was detected at two of the groundwater sampling locations; the highest concentration detected was 76 $\mu\text{g/L}$ at 05GW-105 (duplicate of 05GW-102). Chloroethane was detected in only 05GW-102/05GW-105 groundwater sample at location 05GW02; the detected concentration was 20 $\mu\text{g/L}$ at 05GW-105 (duplicate

TABLE 5-1

**SUMMARY OF VOLATILE ORGANIC COMPOUNDS
 DETECTED IN SURFACE SOIL SAMPLES
 AND ASSOCIATED QUALITY CONTROL SAMPLES
 SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
 NAVAL AMPHIBIOUS BASE - LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 JUNE 30, 1993**

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	05-SS-101 Soil ug/kg	05-SS-102 Soil ug/kg	05-SS-103 Soil ug/kg	05-SS-104 Soil ug/kg	TB-P2-102 Water ug/L	13GWERB Water ug/L	13FWFB Water ug/L
VOLATILE ORGANIC COMPOUNDS (VOCs): Acetone Chloroform	ND	ND	ND	ND	17	ND 3 J	12 ND
TOTAL VOCs: TOTAL TICs:	ND 6 J	ND ND	ND ND	ND ND	17 ND	3 J ND	12 ND

NOTES:

ND indicates compound was not detected

ug/kg indicates micrograms per kilogram

J indicates an estimated value.

TICs indicates tentatively identified compounds

TB indicates trip blank

ERB indicates equipment rinsate blank

FB indicates field blank

Trip blank shared with Background Well samples for RI.

Equipment rinsate blank and field blank shared with Site 13 for RI.

TABLE 5-2

TOTAL ORGANIC CARBON
DETECTED IN SURFACE SOIL SAMPLES
AND ASSOCIATED QUALITY CONTROL SAMPLES
SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
NAVAL AMPHIBIOUS BASE - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA
JUNE 30, 1993

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	05-SS-101 Soil mg/kg	05-SS-102 Soil mg/kg	05-SS-103 Soil mg/kg	05-SS-104 Soil mg/kg	13SB-RB-101 Water mg/L	FB-P2-101 Water mg/L
TOTAL ORGANIC CARBON:	11,000	34,900	11,800	9,520	ND	ND

NOTES:

ND indicates compound was not detected
 mg/kg indicates milligrams per kilogram
 mg/L indicates milligrams per liter
 RB indicates equipment rinsate blank
 FB indicates field blank

of 05GW-102). 1,1-Dichloroethene was detected only in 05GW-102 at an estimated concentration of 2 $\mu\text{g/L}$. Chloroform was detected only in 05GW-104 at an estimated concentration of 3 $\mu\text{g/L}$. The highest total VOCs detected was 96 $\mu\text{g/L}$ at 05GW-105 (duplicate of 05GW-102.) Volatile organic TICs were detected only at 15-SS-101 at a total estimated concentration of 6 $\mu\text{g/kg}$. Table 5-3 presents a summary of VOCs detected in groundwater and associated quality control samples.

Total calcium, lead, and magnesium were detected at all four groundwater sampling locations. Total calcium was detected at concentrations ranging from 31,300 $\mu\text{g/L}$ at 05GW-105 (duplicate 05-GW-102) to 56,800 $\mu\text{g/L}$ at 05GW-103. Total lead was detected at concentrations ranging from an estimated 2.8 $\mu\text{g/L}$ at 05GW-101 to an estimated 214 $\mu\text{g/L}$ at 05GW-103. Total magnesium was detected at concentrations ranging from 7,280 $\mu\text{g/L}$ at 05-GW-103 to 14,900 $\mu\text{g/L}$ at 05GW-102. Table 5-4 presents a summary of total calcium, lead, and magnesium detected in groundwater samples and associated quality control samples.

Dissolved lead was detected only at 05GW-103 at an estimated concentration of 4.1 $\mu\text{g/L}$. Table 5-5 presents a summary of dissolved lead detected in groundwater and associated quality control samples.

Table 5-6 presents a summary of **inorganic analytes** detected in groundwater and associated quality control samples at Site 5.

5.1.2 Site 16 - PCB Capacitor Spill - Pole No. 425

Five surface soil samples were collected from Site 16 at a depth of 0 to 6 inches. Another five samples were collected at a depth of 6 to 12 inches, four of them at the same locations as those of the samples collected between 0"-6". These samples were analyzed for PCBs and TOC.

PCBs (Aroclor-1248) were detected at eight of the ten sampling locations. The highest concentration of PCBs detected was an estimated 2,100,000 $\mu\text{g/kg}$ at 16SS-103. Table 5-7 presents a summary of PCBs detected in surface soil and associated quality control samples. This table contains the results of the analysis conducted with the highest dilution, since analysis at lower dilutions provided results which were outside the linear range of instrument calibration. The laboratory reported both the results, at lower and higher dilution, for five of the ten samples analyzed for PCBs at Site 16.

TOC was detected in all ten surface soil samples collected from Site 16. Concentrations detected ranged from 4,420 mg/kg at 16SS-105 to 26,200 mg/kg at 16SS-107. Table 5-8 presents a summary of TOC detected in surface soils and associated quality control samples at Site 16.

5.2 Quality Assurance Results

Quality Assurance results are evaluated utilizing the analytical data obtained from QA/QC samples, which were collected in accordance with the Sampling and Analysis Plan.

These samples included:

TABLE 5-3

SUMMARY OF VOLATILE ORGANIC COMPOUNDS
DETECTED IN GROUNDWATER SAMPLES
AND ASSOCIATED QUALITY CONTROL SAMPLES
SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
NAVAL AMPHIBIOUS BASE - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA
MAY 14, 1993

SAMPLE LOCATION/NUMBER	05GW-101	05GW-102	05GW-105 (Duplicate 05GW-102)	05GW-103	05GW-104 ⁽¹⁾	05GW-ER	05FB-101	Trip Blank
SAMPLE MATRIX UNITS	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L
VOLATILE ORGANIC COMPOUNDS (VOCs):								
Chloroethane	ND	17	20	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	17	13
1,1-Dichloroethene	ND	2 J	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	67	76	ND	2 J	ND	ND	ND
Chloroform	ND	ND	ND	ND	3 J	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	1 J
TOTAL VOCs:	ND	86 J	96	ND	5 J	ND	17	14 J
TOTAL TICs:	ND	5 J	ND	ND	ND	ND	ND	ND

NOTES:

ND indicates compound was not detected

ug/L indicates micrograms per liter

J indicates an estimated value

TICs indicates tentatively identified compounds

⁽¹⁾ indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinsate blank

FB indicates field blank

TABLE 5-4

TOTAL METALS
DETECTED IN GROUNDWATER SAMPLES
AND ASSOCIATED QUALITY CONTROL SAMPLES
SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
NAVAL AMPHIBIOUS BASE - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA
MAY 14, 1993

SAMPLE LOCATION/NUMBER	05GW-101	05GW-102	05GW-105 (Duplicate 05GW-102)	05GW-103	05GW-104 ⁽¹⁾	05GW-ER	05FB-101
SAMPLE MATRIX UNITS	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L
TOTAL METALS:							
Calcium	66,900	34,600	31,300	56,800	56,700	ND	ND
Lead	2.8 J	5.6 J	9.0 J	214 J	6.0 J	ND	2.5 J
Magnesium	17,400	14,900	14,600	7,280	7,920	ND	24.4 B

NOTES:

ND indicates compound was Not Detected

ug/L indicates micrograms per liter

B indicates compound detected in lab blank

J indicates an estimated value

(1) indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinse blank

FB indicates field blank

TABLE 5--5

TOTAL DISSOLVED LEAD
 DETECTED IN GROUNDWATER SAMPLES
 AND ASSOCIATED QUALITY CONTROL SAMPLES
 SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
 NAVAL AMPHIBIOUS BASE - LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 MAY 14, 1993

SAMPLE LOCATION/NUMBER	05GW-101	05GW-102	05GW-105 (Duplicate 05GW-102)	05GW-103	05GW-104 ⁽¹⁾	05GW-ER	05FB-101
SAMPLE MATRIX UNITS	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L	Water ug/L
TOTAL DISSOLVED LEAD:	ND	ND	ND	4.1 J	ND	ND	ND

NOTES:

ND indicates compound was not detected

ug/L indicates micrograms per liter

J indicates an estimated value.

(1) indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinsate blank

FB indicates field blank

TABLE 5-6

**INORGANIC ANALYTES
 DETECTED IN GROUNDWATER SAMPLES
 AND ASSOCIATED QUALITY CONTROL SAMPLES
 SITE 5 - BUILDINGS 9-11 MOTOR OIL DISPOSAL AREA
 NAVAL AMPHIBIOUS BASE - LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 MAY 14, 1993**

SAMPLE LOCATION/NUMBER	05GW-101	05GW-102	05GW-105 (Duplicate - 5GW-102)	05GW-103	05GW-104 ⁽¹⁾	05GW-ER	05FB-101
SAMPLE MATRIX	Water	Water	Water	Water	Water	Water	Water
INORGANIC ANALYTES:							
Alkalinity (mg/L)	247	345	355	278	198	ND	ND
Bicarbonate Alkalinity (mg/L)	247	344	355	278	198	ND	ND
pH (S.U.)	6.88	7.52	7.48	6.74	7.05	ND	ND

NOTES:

ND indicates compound was not detected

mg/L indicates milligrams per liter

S.U. indicates standard units

(1) indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinse blank

FB indicates field blank

TABLE 5-7

SUMMARY OF PCBs
DETECTED IN SURFACE SOIL SAMPLES
AND ASSOCIATED QUALITY CONTROL SAMPLES
SITE 16 - PCB CAPACITOR SPILL - POLE NO. 425
NAVAL AMPHIBIOUS BASE - LITTLE CREEK
VIRGINIA BEACH, VIRGINIA
MAY 14, 1993

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	16SS-101 Soil ug/kg	16SS-102 Soil ug/kg	16SS-103 Soil ug/kg	16SS-104 Soil ug/kg	16SS-105 Soil ug/kg	16SS-106 Soil ug/kg	16SS-107 ⁽¹⁾ Soil ug/kg	16SS-108 Soil ug/kg
PCBs: Aroclor-1248	29,000 DJ	12,000 DJ	2,100,000 DJ	43,000 DJ	8,300 DJ	2,500 J	880	ND
TOTAL PCBs:	29,000 DJ	12,000 DJ	2,100,000 DJ	43,000 DJ	8,300 DJ	2,500 J	880	ND

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	16SS-109 Soil ug/kg	16SS-110 Soil ug/kg	16SS-111 (Duplicate 16SS-110) Soil ug/kg	16SS-ER1 Water ug/L	16SS-ER2 Water ug/L	16SS-ER3 Water ug/L	16SS-ER4 Water ug/L
PCBs: Aroclor-1248	1,800 J	ND	ND	ND	ND	ND	ND
TOTAL PCBs:	1,800 J	ND	ND	ND	ND	ND	ND

NOTES:

ND indicates compound was not detected

ug/kg indicates micrograms per kilogram

ug/L indicates micrograms per liter

D indicates quantitation performed on the diluted sample

J indicates an estimated value

⁽¹⁾ indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinsate blank

TABLE 5-8

**SUMMARY OF TOTAL ORGANIC CARBON
 DETECTED IN SURFACE SOIL
 AND ASSOCIATED QUALITY CONTROL SAMPLES
 SITE 16 - PCB CAPACITOR SPILL - POLE NO. 425
 NAVAL AMPHIBIOUS BASE - LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 MAY 14, 1993**

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	16SS-101 Soil mg/kg	16SS-102 Soil mg/kg	16SS-103 Soil mg/kg	16SS-104 Soil mg/kg	16SS-105 Soil mg/kg	16SS-106 Soil mg/kg	16SS-107 ⁽¹⁾ Soil mg/kg
TOTAL ORGANIC CARBON:	7,810	12,100	17,800	9,420	4,420	6,070	26,200

SAMPLE LOCATION/NUMBER SAMPLE MATRIX UNITS	16SS-108 Soil mg/kg	16SS-109 Soil mg/kg	16SS-110 Soil mg/kg	16SS-111 (Duplicate 16SS-110) Soil mg/kg	16SS-ER1 Water mg/L	05FB-101 Water mg/L
TOTAL ORGANIC CARBON:	13,300	13,300	6,440	7,260	ND	ND

NOTES:

ND indicates compound was not detected

mg/kg indicates milligrams per kilogram

mg/L indicates micrograms per liter

(1) indicates a matrix spike/matrix spike duplicate (MS/MSD) sample was collected with this sample

ER indicates equipment rinsate blank

FB indicates field blank

- Field duplicate samples collected to assess the overall precision of the sampling and analysis program;
- Trip blanks for evaluating potential volatile organic compounds cross contamination during sample shipment and storage;
- Field blanks to evaluate potential cross-contamination by the water being used; and,
- Equipment rinsate blanks to assess potential cross-contamination during sampling equipment decontamination procedures.

Trip blanks were analyzed only for target compounds list (TCL) volatile organic compounds (VOCs). Field duplicates, field blanks and equipment rinsate blanks were analyzed for the same parameters as the environmental samples with which they were associated.

The laboratory analytical results (data packages) were validated for completeness, quality assurance/quality control compliance and to determine usability of the results in meeting the data quality objectives (DQOs) established in order to achieve the project objectives.

For the analytical parameters analyzed following USEPA Contract Laboratory Program, (CLP); the organic data packages were validated following the guidelines identified in "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analysis, June, 1991, and specific method requirements specified in OLMO1.8. The CLP inorganic data were validated utilizing the "Laboratory Data Validation Guidelines for Evaluating Inorganic Analysis, July 1, 1988, and specific method requirements specified in ILMO2.1, and NEESA Level D requirements.

The data for non-CLP analytical parameters have been validated utilizing specific analytical method requirements and NEESA Level C or E requirements. In all cases the USEPA CLP data qualifiers were utilized and assigned to the analytical results, when applicable, during the data review process.

Site 5

Acetone was reported in two blanks associated with groundwater samples from this site, however acetone was not detected in any of the environmental samples. Lead was reported in one blank associated with groundwater samples at an estimated trace level, magnesium was also reported in the same blank at low concentration. These low concentrations will not affect the usability of the site data.

Site 16

The blank samples associated with Site 16 environmental samples did not contain any of the analytes of interest. The QA/QC samples data for the site indicate trace level cross-contamination, mostly by common laboratory solvents and common metals. These occurrences have no impact on the validity or usability of the environmental data obtained during this investigation.

5.3 Extent of Constituents of Concern

Surface soil data represents potential direct contact pathways through surface exposure. The surface soil data frequently will identify those areas where constituents of concern may lie uncovered. Groundwater data identifies those constituents which have dissolved into the saturated zone and may migrate with groundwater flow from the area of concern.

A summary of the characteristics, concentrations, and horizontal extent of the impact to soil and groundwater is presented in this section.

5.3.1 Site 5 - Buildings 9-11 Motor Oil Disposal Area

Chloroethane and 1,1-DCA are the only two VOCs detected in site groundwater. Figure 5-1 identifies their distribution at site 5. Both of these compounds do not have any Federal Drinking Water Standard Maximum Contaminant Levels (MCLs) or the Virginia State Water Control Board (VSWCB) Water Quality Standards (WQSS). Since no groundwater criteria exist for the site, the maximum detected concentrations were compared with the tap water standards in the United States Environmental Protection Agency (EPA) Region III Risk-Based Concentration (RBC) Table, July 1993. The EPA Region III RBC Table is contained in Appendix I. The maximum detected concentration of chloroethane and 1,1-DCA, 20 ug/L and 76 ug/L respectively, are well below their respective RBCs of 710 ug/L and 810 ug/L. Therefore, these constituents of concern need not be further addressed. It should be noted, however, that 1,1-DCA concentration has increases three-fold from the level detected during the PSI. Further monitoring is recommended to track levels of this compound in groundwater.

The maximum concentration of total lead detected in groundwater is 214 ug/l; however, the associated dissolved lead concentration is only 4.1 ug/l, well below VSWCB groundwater criteria of 50 ug/l. Therefore, no TAL constituents of concern need to be addressed in the site groundwater.

Total alkalinity of site groundwater was measured between 198 mg/L and 355 mg/L, as shown in Table 5-6, which is within the acceptable range of 30-500 mg/L, promulgated under the VSWCB groundwater criteria for the Coastal Plain Physiographic Province. Groundwater pH was observed between 6.74 and 7.52, indicating no concern with acidic or alkaline contents.

Since 1,1-DCA was detected in site groundwater, surface soil sampling was conducted around the concrete pad of the old building T-10. No volatile organic constituents of concern were detected in the four surface samples collected. However, the extent of VOCs at the entire site can not be determined based on the SI samples alone. The PSI indicated that 1,1-DCA or chloroethane were not detected in surface soil samples between buildings T-9 and T-11. It is possible to have subsurface contamination beneath these areas.



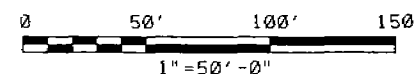
LC5-GW02	
COMPOUND	CONCENTRATION (ug/l)
1,1 - DCA	76
Chloroethane	20

LC5-GW03	
COMPOUND	CONCENTRATION (ug/l)
Total Lead	214
Dissolved Lead	4.1

LEGEND

- SITE BOUNDARY
- EXISTING MONITORING WELL
LC5-GW02
- MONITORING WELL INSTALLED BY FWES
LC5-GW04

GRAPHIC SCALE



A	10-29-93	DRAFT TO LANDTV	
REV.	DATE	DESCRIPTION	APPR.
REVISIONS			
FIGURE 5-1			
TCL VOL's AND TAL METALS IN GROUNDWATER SITE 5 NAB - LITTLE CREEK VIRGINIA BEACH, VIRGINIA			
This drawing is the property of the FOSTER WHEELER ENVIRONMENTAL SERVICES LIVINGSTON, NEW JERSEY AND IS LOANED WITHOUT CONSIDERATION OTHER THAN THE BORROWER'S AGREEMENT THAT IT SHALL NOT BE RE- PRODUCED, COPIED, LOANED, OR DISPOSED OF DIRECTLY OR INDIRECTLY NOR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.			
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APPROVED BY:			192071-4-48-0540
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NOV 02 28-OCT-93

5.3.2 Site 16 - PCB Capacitor Spill - Pole No. 425

Aroclor-1248 was the only PCB detected at the site. The maximum concentration detected was an estimated 2,100 mg/kg, which is well above the RCRA cleanup requirement (40 CFR 761 Subpart G) of 10 mg/kg for non-residential property. (The site is located approximately 100 to 150 feet from the base campground. The campground population is transitory and seasonal and the location of Site 16 is along a road which may only have contact with occasional joggers. It is highly unlikely that campground patrons will access the site due to its proximity to the road and the heavy concentration of weeds and brush buffering the site from the campground.)

The results of the soil samples analyzed by the laboratory provided data for comparison with the results of the Dextil L2000 to determine possible correlation between both analytical methods. Table 5-9 summarizes screening results with corresponding laboratory analyses. As indicated by Table 5-9, actual PCB concentrations in soils generally increased slightly with increases in screened PCB concentrations, with the exception of one outlier. Screened PCB concentrations below 5.4 ppm corresponded closely with the laboratory analyzed PCB concentrations below 8.30 ppm. Since screening results at sample nodes unconfirmed by laboratory analysis were all below 5.9 ppm, it is concluded that actual PCB concentrations above 10 ppm are localized around sample nodes 10, 11, 12, and 18.

Therefore, based on the field screening and laboratory analysis of the surface soil samples, a preliminary extent of PCB constituent of concern is identified in Figure 5-2. This is approximately a 575 square feet area, as compared to the entire site area of 1,800 square feet. Since PCBs are highly immobile, the contamination is expected to remain within the identified area until the commencement of remedial and/or removal action. At that time a minimum of 24 inches of soil will be removed from the impacted area. Confirmatory sampling will also be performed to ensure cleanup levels are met. At least two feet of clean fill will be used to cover the excavation site which will afford an additional magnitude of reduced risk.



DEMOLITION DEBRIS
LANDFILL (SITE 8)

AMPHIBIOUS DRIVE

POLE HJ85

STEAM LINE
(ABOVE GROUND)

AREA 2
(APPROX.
175 SQ. FT.)

AREA 1
(APPROX.
400 SQ. FT.)


CAMPGROUND

NOTES:

1. EACH GRID EQUALS APPROX. 10'-0"

LEGEND

- SITE BOUNDARY
- FIELD SCREENING SAMPLES
USING DEXSIL L-2000
- FIELD SCREENING SAMPLES
USING DEXSIL AND SENT TO LAB.
- APPROXIMATE EXTENT OF PCB'S

A	10-29-93	DRAFT TO LANTDIV	
REV.	DATE	DESCRIPTION	APPR.
REVISIONS			
FIGURE 5-2			
EXTENT OF PCB CONTAMINATION			
SITE 16			
NAB - LITTLE CREEK			
VIRGINIA BEACH, VIRGINIA			
 This Drawing is the property of the FOSTER WHEELER ENVIRONMENTAL SERVICES LIVINGSTON, NEW JERSEY AND IS LOANED WITHOUT COMPENSATION OTHER THAN THE BORROWER'S AGREEMENT THAT IT SHALL NOT BE RE- PRODUCED, COPIED, LOANED, OR DISPOSED OF DIRECTLY OR INDIRECTLY NOR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SPECIFICALLY FURNISHED.			
DRAWN BY:	SAW	10/19/93	SCALE: GRID
CHECKED BY:			DRAWING No.
APPROVED BY:			192071-4-48-1640
			REV. A

FWSH.REF

EC-100-82
20
NOV-93

TABLE 5-9
 COMPARISON OF FIELD SCREENING AND LABORATORY RESULTS
 SITE 16 - PCB CAPACITOR SPILL - POLE NO. 425
 NAVAL AMPHIBIOUS BASE LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 MAY 14, 1993

SAMPLE NODE	DEPTH	DEXIL L2000 RESULT (ppm)	ANALYTICAL RESULT (ppm)
6	0-6"	4.2	0.880
6	6"-12"	3.1	0.038 U
9	0-6"	3.8	8.30
9	6-12"	4.5	2.50
11	0-6"	7.4	2100
11	6"-12"	18.3	43
12	0-6"	10.9	29
12	6"-12"	22.7	12
18	6"-12"	3.4	0.037 U
19	0-6"	5.4	1.80

U indicates not detected

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section will summarize the findings of the Site Inspection, and present a preliminary remediation assessment based on IAS, PSI, and SI results. It should be noted that data comparisons among various studies is limited by the variability of analytical and validation procedures used during different time-frames.

6.1 Site 5 - Buildings 9-11 Motor Oil Disposal Area

No constituents of concern have been detected in surface soils sampled within the limits of the study area. 1,1-DCA has been consistently detected in monitoring well GW-2. The level has increased from 23.2 ug/L in 1991 to 76 ug/L in May 1993. However, 1,1-DCA has not been detected in any of the three other wells at the site, during either of the sampling event. The absence of 1,1-DCA in surface soils prohibited identification of any contamination source within site boundaries; it is probable that such a source may exist outside the site boundaries. The levels of 1,1-DCA detected at the site do not warrant any remedial response.

Semiannual monitoring is recommended at the site in order to ensure that VOC levels in site groundwater do not rise above the RBCs posing potential risks.

TPH samples obtained during the PSI indicated low levels of TPH suggesting that the reported dumping of waste oil between Buildings 9 and 11 was evidently grossly overestimated or overstated. Further soil TPH sampling is not required.

6.2 Site 16 - PCB Capacitor Spill - Pole No. 425

PCBs have been detected at concentrations above the RCRA cleanup level since the 1981 capacitor spill. A concentration of 1,000 mg/kg was reported in 1981. The PSI reported PCB concentrations up to 750 mg/kg, and the aroclor identified was 1242. Analysis conducted during the SI have indicated concentration as high as 2,100 mg/kg for Aroclor-1248. A soil removal action is recommended for the site. A preliminary extent of removal action has been identified in Figure 5-2. In addition, a soil sample should be collected for field screening to determine PCB levels, if any, across the road from pole No. 425. Also, an Engineering Evaluation/ Cost Analysis (EE/CA) is recommended for the proper identification of removal action alternatives and costs.

TABLE 2-1

SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
 SITE 5: BUILDING 9 - 11 MOTOR OIL DISPOSAL AREA
 NAB LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 PRELIMINARY SITE INSPECTION
 JULY 1991

PARAMETER	5-GW01	5-GW02	5-GW03
VOLATILE ORGANIC COMPOUNDS (ug/l)			
1,1-DICHLOROETHANE		23.2	
TOTAL PETROLEUM HYDROCARBONS (mg/l)			
METALS (ug/l)			
LEAD	9.2	24	15

NOTES:

All results in units specified
 Blank indicates compound was not detected
 Total petroleum hydrocarbons analyzed using EPA Method 418.1.

SUMMARY OF ANALYTICAL RESULTS FOR SURFACE SOIL SAMPLES
 SITE 5: BUILDING 9 - 11 MOTOR OIL DISPOSAL AREA
 NAB LITTLE CREEK
 VIRGINIA BEACH, VIRGINIA
 PRELIMINARY SITE INSPECTION
 JULY 1991

PARAMETER	5-SS04	5-SS06	5-SS07	5-SS08
VOLATILE ORGANIC COMPOUNDS (ug/l)				
TOTAL PETROLEUM HYDROCARBONS (mg/kg)	73.3	89.9	89.3	94.0
METALS (mg/kg)				
LEAD	4.1	8.6	1.8	4.3

NOTES:

All results in units specified
 Blank indicates compound was not detected
 Total petroleum hydrocarbons analyzed using EPA Method 418.1.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This section will summarize the findings of the Site Inspection, and present a preliminary remediation assessment based on IAS, PSI, and SI results. It should be noted that data comparisons among various studies is limited by the variability of analytical and validation procedures used during different time-frames.

6.1 Site 5 - Buildings 9-11 Motor Oil Disposal Area

No constituents of concern have been detected in surface soils sampled within the limits of the study area. 1,1-DCA has been consistently detected in monitoring well GW-2. The level has increased from 23.2 ug/L in 1991 to 76 ug/L in May 1993. However, 1,1-DCA has not been detected in any of the three other wells at the site, during either of the sampling event. The absence of 1,1-DCA in surface soils prohibited identification of any contamination source within site boundaries; it is probable that such a source may exist outside the site boundaries. The levels of 1,1-DCA detected at the site do not warrant any remedial response.

Semiannual monitoring is recommended at the site in order to ensure that VOC levels in site groundwater do not rise above the RBCs posing potential risks. Upgradient areas of the site should also be investigated to identify the potential source of 1,1-DCA and execute an appropriate remedial action for such a source, if identified.

6.2 Site 16 - PCB Capacitor Spill - Pole No. 425

PCBs have been detected at concentrations above the RCRA cleanup level since the 1981 capacitor spill. A concentration of 1,000 mg/kg was reported in 1981. The PSI reported PCB concentrations up to 750 mg/kg, and the aroclor identified was 1242. Analysis conducted during the SI have indicated concentration as high as 2,100 mg/kg for Aroclor-1248. A soil removal action is recommended for the site. A preliminary extent of removal action has been identified in Figure 5-2. However, an Engineering Evaluation/ Cost Analysis (EE/CA) is recommended for the proper identification of removal action alternatives and costs.

APPENDIX A
List of Acronyms/Abbreviations

Acronym/Abbreviation	Description
ASTM	American Society for Testing and Materials
bgs	below ground surface
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action Navy (Program)
CLP	Contract Laboratory Program
CRQL	Contract Required Quantitation Limit
CTO	Contract Task Order
DCA	dichloroethane
DQOs	data quality objectives
EE/CA	engineering evaluation / cost evaluation
EPA	Environmental Protection Agency
°F	degrees fahrenheit
FS	Feasibility Study
ft	feet/foot
FWES	Foster Wheeler Environmental Services
gpm	gallons per minute
GW	groundwater monitoring well
IAS	Initial Assessment Study
ID	inner diameter
IP/FP	Implementation Plan/Fee Proposal
IR	Installation Restoration

Acronym/Abbreviation	Description
IRI	Interim Remedial Investigation
IRP	Installation Restoration Program
LANTDIV	Atlantic Division
MCLs	Maximum Contaminant Levels
MDL	method detection limit
MSL or msl	mean sea level
$\mu\text{g/l}$	micrograms/liter (equivalent to ppb)
mg/kg	milligrams/kilogram (equivalent to ppm)
mm	millimeter
mmhos/m	millimhos/meter
MW	monitoring well
NAB	Naval Amphibious Base
NABLC	Naval Amphibious Base Little Creek
NACIP	Naval Assessment and Control of Installation Pollutants
NEESA	Naval Energy and Environmental Support Activity
NOAA	National Oceanic and Atmospheric Administration
PCBs	polychlorinated biphenyls
pH	logarithm of the reciprocal of the hydrogen ion concentration of a solution
PID	photoionization device
ppb	parts per billion
ppm	parts per million
PSI	Preliminary Site Inspection
PVC	polyvinyl chloride
RA	Risk Assessment

Acronym/Abbreviation	Description
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS/RA	Remedial Investigation/Feasibility Study/Remedial Assessment
RMCL	Recommended Maximum Contaminant Level
SARA	Superfund Amendments and Reauthorization Act of 1986
SCS	Soil Conservation Service
SI	Site Inspection
SOW	Statement of Work
SS	surface soil
SVOCs	semi-volatile compounds
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
TSCA	Toxic Substances Control Act
ug/kg	micrograms per kilogram
ug/l	micrograms/liter
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VO	volatile organic
VOCs	volatile organic compounds
VSWCB	Virginia State Water Control Board
WQS	Water Quality Standards

FOSTER WHEELER ENVIRONMENTAL SERVICES TEST BORING LOG

DATE: 5/11/93

LOCATION: Site 5

NAB - Little Creek

DRILLING CONTRACTOR: McCallum, Inc.

DRILLER: Raleigh Smith

SIZE/TYPE OF BIT: 4 1/4" ID

START/FINISH DATE: 5/11/93 - 5/11/93

SCREEN: _____ LENGTH: _____ TO _____ FEET

REMARKS:

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
0-2	01	1.00	9-2-2-1	Top 5" gravel fill material, light brown M SAND, trace silt.	2
2-4	02	0.91	2-1-2-4	Top 5" light brown M-SAND, trace silt, rest well sorted M- SAND with brown mottling, damp.	22
4-6	03	1.50	4-4-5-5	Top 6.5" M- well sorted SAND, brown, trace silt, moist, then 4" light brown well sorted M SAND with brown mottles. Wet shell fragments. Rest dark gray M SILTY SAND with shell fragments.	3
6-8	04	2.00	4-1-1-1	Top 3.5" sluff, rest dark gray M-F SILTY SAND with shell fragments, grading into dark gray silt. Lower 4" saturated.	-
8-10	05	2.00	2-2-2-3	Top 3" sluff, then 3" dark gray CLAY, damp with root material grading into light tan SILTY CLAY with brown rust colored mottling.	-
10-12	06	2.00	2-2-2-3	Top 6" sluff, then 2" gray damp CLAY, rest light brown SILTY CLAY with rusty brown mottles.	-
12-14	07	2.00	2-1-2-4	Top 7" dark gray SILTY CLAY with root material, then light gray CLAYEY SILT grading into light brown SILTY CLAY with some sand and rusty mottling.	-

FOSTER WHEELER ENVIRONMENTAL SERVICES
TEST BORING LOG (continued)

BORING NO.: 05 - SB - 04
PROJECT NO./NAME: 4-22-00-192071 /
NAB - Little Creek

DATE: 5/11/93
LOCATION: Site 5

GEOLOGIST/OFFICE: A. Garibaldi / Livingston, NJ

DRILLING CONTRACTOR: McCallum, Inc.
DRILLER: Raleigh Smith

DEPTH (FT)	SAMPLE NO. AND TYPE	RECOVERY (FT)	PENETRATION RESISTANCE BLOWS/6"	SAMPLE DESCRIPTION	PID READING (PPM)
14-16	08	2.00	8-6-6-8	Top 4" sluff, then light brown SILTY CLAY with some sand grading into M-F light brown SILTY SAND. Wet at bottom of spoon.	3

NEW APPENDIX C

WELL CONSTRUCTION LOG (UNCONSOLIDATED)

Project NAB-Little Creek CTO-0042 Well LC5-GW04

Location Site 5 - Builings 9-11 Motor Oil Disposal Area

Town/City Virginia Beach

County N/A State Virginia

Permit No. N/A

Land-Surface Elevation and Datum 9.70 feet

Installation Date (s) 5/11/93

Drilling Method 4 1/4" hollow stem auger

Drilling Contractor McCallum

Drilling Fluid N/A

Development Technique(s) and Dates (s) Pump -
5/11/93 & 5/12/93

Water Removed During Development 18 gallons

Static Depth to Water 9.44 feet below ground level

Pumping Depth to Water N/A feet below ground level

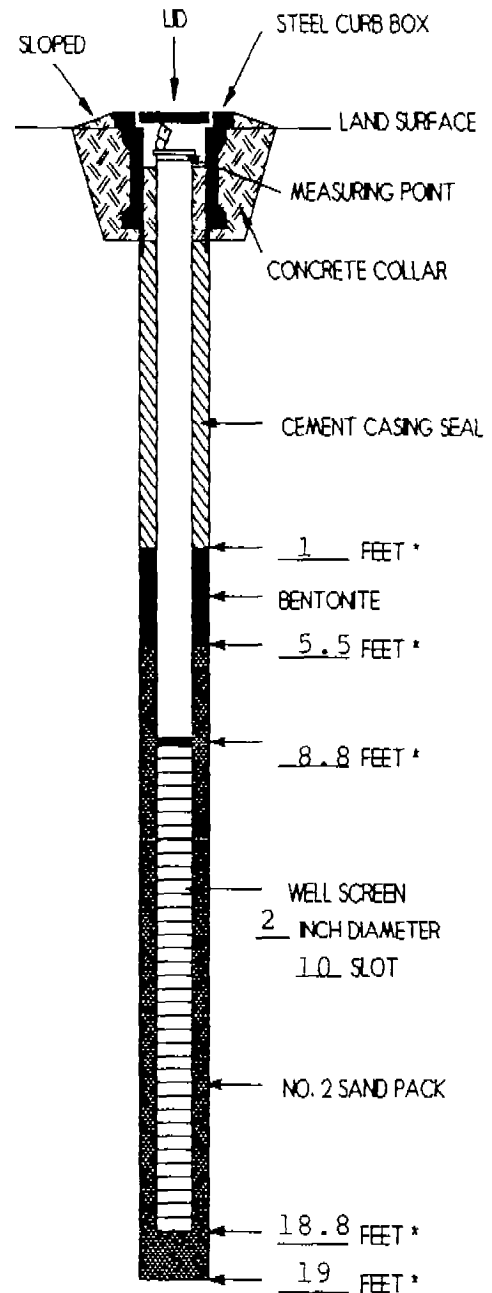
Total Pumping Duration 25 minutes

Yield 0.72 gpm

Well Purpose Groundwater monitoring

Remarks _____

Geologist/# A. Garibaldi



* DEPTH BELOW LAND SURFACE

EBASCO

DRILLING METHOD Hollow Stem Auger

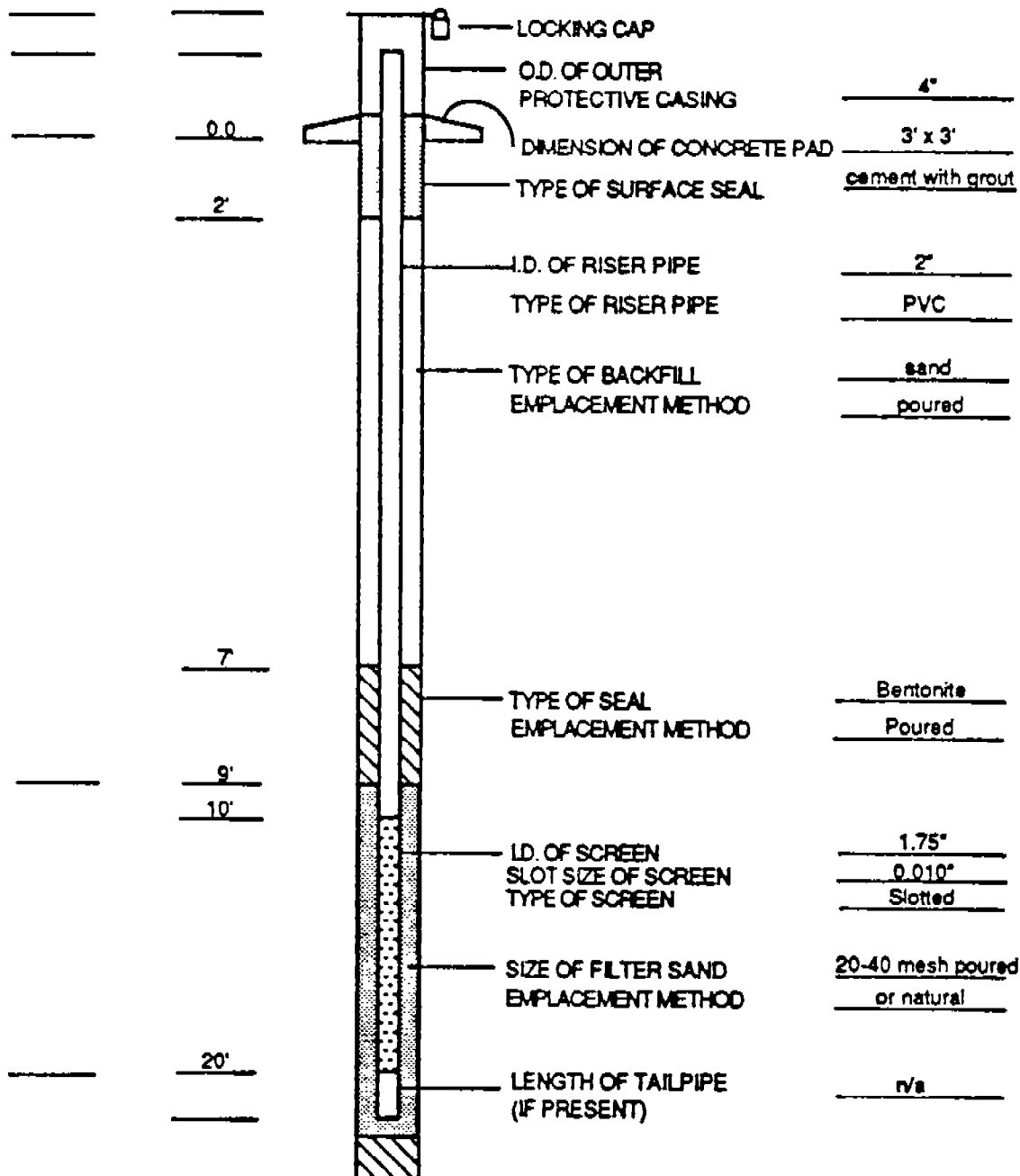
MONITORING WELL NUMBER LC5-GW01

DATE OF WELL INSTALLATION 12/10/90

DATE OF WELL DEVELOPMENT 12/12/90

GEOLOGIST S. MAHMUD

DEPTH OR
HEIGHT FROM
GROUND SURFACE



N/A - NOT APPLICABLE

[illegible]

EBASCO

ELEVATION (M.S.L.)	DEPTH OR HEIGHT FROM GROUND SURFACE
-----------------------	---



WATER LEVEL MEASUREMENTS	DATE								
	DEPTH FROM TOP OF RISER PIPE								
	ELEVATION								

EBASCO

ELEVATION (M.S.L.)	DEPTH OR HEIGHT FROM GROUND SURFACE
-----------------------	---

[illegible]

WATER LEVEL DATA
SITE 5 – BUILDINGS 9 – 11 MOTOR OIL DISPOSAL AREA

WELL NUMBER	MAY 14, 1993	JUNE 29, 1993
LC5–GW01	8.60	10.21
LC5–GW02	10.43	11.17
LC5–GW03	5.40	6.16
LC5–GW04	5.94	6.73

WATER LEVEL FORM

PROJECT: LCNAB - RI/FS

MEASURING DEVICE:

[illegible]

Transcribed - A Gar. bald field notes



WATER LEVEL FORM

PROJECT: Little Creek NAB-RT/FS MEASURING DEVICE: _____

Site	WELL #	DATE	TIME	MEASURING POINT (M.P.)	DEPTH TO WATER FROM M.P.	DEPTH OF WELL FROM M.P.	
	BMW-6	6/29/93	0837	TOC	6.36	12.41	4in
	BMW-5	6/29/93	0843	TOC	4.98	12.60	4in
Lock	BMW-4	6/29/93	0857	TOC	6.21	12.53	4in
	BMW-3	6/29/93	0908	TOC	4.80	5.45	4in
	BMW-2	6/29/93	0914	TOC	2.29	12.64	4in
Lock	BMW-1	6/29/93	0927	TOC	8.87	12.52	4in
	BMW ²⁹	6/29/93	0948	TOC	4.15	12.15	4in
Container	LC5-3	6/29/93	1024	TOC	6.16	18.96	
	LC5-4	6/29/93	1029	TOC	6.73	15.27	
Far	LC5-1	6/29/93	1032	TOC	10.21	22.23	
Near	LC5-2	6/29/93	1034	TOC	11.17	22.41	
7	7	6/29/93	1115	TOC	3.41	11.42	
	8	6/29/93	1133	TOC	4.41	11.12	
	LC13-6W3	7/29/93	1520	TOC	5.75	14.08	
	LC13-6W4		1635	TOC	5.67	14.82	
	LC13-6W5		1735	TOC	5.35	14.32	
	LC13-6W6		1550	TOC	5.50	12.80	
	LC13-6W7		1710	TOC	6.20	12.93	
	LC13-6W8		1430	TOC	5.83	12.26	

→ D T Oil

SURFACE SOIL SAMPLE DESCRIPTIONS

SURFACE SOIL SAMPLE NUMBER	SURFACE SOIL SAMPLE DESCRIPTION
05SS-101	North side of concrete pad. Upper 1" GRAVEL with some dry, brown c-f poorly sorted SAND, then brown to light brown c-f poorly sorted SAND.
05SS-102	East side of concrete pad. Upper 1" GRAVEL with some dry, brown c-f poorly sorted SAND, then light brown m-f moderately sorted SAND. Staining on surface at sample location.
05SS-103	South side of concrete pad. Upper 2" GRAVEL with some dry dark brown c-f poorly sorted SAND, then dark brown c-f poorly sorted SAND.
05SS-104	West side of concrete pad: Upper 2" GRAVEL with some brown m-f moderately sorted SAND.
16SS-101	0" to 6". Reddish-brown sandy loam with a large amount of organic material.
16SS-102	6" to 12". Reddish-brown sandy loam with a large amount of organic material. Collected below sample 16SS-101.
16SS-103	0" to 6". Reddish-brown sandy loam with a large amount of organic material.
16SS-104	6" to 12". Reddish-brown sandy loam with a large amount of organic material. Collected below sample 16SS-103.
16SS-105	0" to 6". Reddish-brown sandy loam with a large amount of organic material.
16SS-106	6" to 12". Reddish-brown sandy loam with a large amount of organic material. Collected below sample 16SS-105.
16SS-107	0" to 6". Reddish-brown sandy loam with a large amount of organic material.
16SS-108	6" to 12". Reddish-brown sandy loam with a large amount of organic material. Collected below sample 16SS-107.
16SS-109	0" to 6". Reddish-brown sandy loam with a large amount of organic material.
16SS-110 & 16SS-111	6" to 12". Reddish-brown sandy loam with a large amount of organic material. 16SS-111 is a field duplicate.

SURFACE SOIL SAMPLE DESCRIPTIONS

SURFACE SOIL SAMPLE NUMBER	SURFACE SOIL SAMPLE DESCRIPTION
16SS-101	30' west of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-107	30' east of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-108	30' west of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-114	30' east of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-115	15' south of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-116	15' south of Pole No. 425: redish-brown sandy loam with a large amount of organic material.
16SS-123	40' south of sample 16SS-115: redish-brown sandy loam with a large amount of organic material.
16SS-124	40' south of sample 16SS-116: redish-brown sandy loam with a large amount of organic material.

13737

NNNN

Preliminary Local Climatological Data (WS Form: F-6)

Station: WSO. NORFOLK. VA

Month: MAY

Year: 1993

Latitude

Longitude

+3654

+7612

Gnd Elev. 24 ft.

Std Time: EST

Temperature in Fahrenheit										: Precip(in.):		Snow	Wind	Fastest 1-Min:	Sunshine :	Skv	: Peak Wind			
										Columns										
-1-	-2-	-3-	-4-	-5-	-6a-	-6b-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-		
Day	Max	Min	Avg	Dep.	HDD	CDD	Water	Snow	Depth	Avg.	Speed	Dir	Mins.	IPSNL	SR-SS	Weather	Speed	Dir		
1	78	46	62	0	3	0	0.00	0.0	0	6.6	14	13	792	96	6		20	SE		
2	81	54	68	6	0	3	0.00	0.0	0	9.7	16	14	687	83	4		22	SE		
3	74	57	66	4	0	1	0.00	0.0	0	9.0	15	09	640	77	8 1		21	E		
4	77	61	69	6	0	4	0	0.0	0	11.0	20	12	317	38	8		23	E		
5	74	64	69	6	0	4	0.21	0.0	0	9.2	12	15	82	10	10		18	SE		
6	79	61	70	7	0	5	0.17	0.0	0	7.9	21	26	663	80	3 1.3.8		29	W		
7	74	58	66	3	0	1	0.00	0.0	0	8.4	16	05	631	76	3 1.8		20	NE		
8	73	55	64	0	1	0	0.00	0.0	0	8.1	12	13	763	91	3		17	E		
9	81	53	67	3	0	2	0.00	0.0	0	7.5	15	14	720	86	6		18	SE		
10	84	59	72	8	0	7	0.00	0.0	0	9.4	17	12	699	83	1		20	SE		
11	87	62	75	10	0	10	0.00	0.0	0	10.5	14	24	704	84	1 0		21	SW		
12	89	64	77	12	0	12	0.23	0.0	0	9.7	20	33	478	57	8 1.3.8		30	NW		
13	82	62	72	7	0	7	0.20	0.0	0	12.0	17	05	241	29	10		29	SW		
14	67	55	61	-4	4	0	0.20	0.0	0	9.0	16	05	415	49	0 1		21	NE		
15	82	53	68	2	0	3	0.00	0.0	0	11.7	21	22	840	100	0		28	SW		
16	87	63	75	9	0	10	0.00	0.0	0	13.4	20	24	839	99	2		37	N		
17	74	62	68	1	0	3	0.00	0.0	0	9.1	20	05	379	45	9 1.8		20	NE		
18	84	62	73	6	0	8	0.06	0.0	0	9.2	18	33	213	25	9 2.3.8		33	NW		
19	79	63	71	4	0	6	0.57	0.0	0	7.9	14	16	224	26	9 1.3		21	S		
20	66	58	62	-5	3	0	0.02	0.0	0	10.1	16	36	0	0	9 1.8		22	N		
21	67	51	59	-9	4	0	0.00	0.0	0	8.7	16	01	699	82	3		21	NE		
22	69	52	61	-7	4	0	0.05	0.0	0	7.1	15	01	478	56	4 3		24	N		
23	79	50	65	-3	0	0	0.00	0.0	0	7.9	16	22	737	86	6		16	SE		
24	83	62	73	5	0	8	0.00	0.0	0	15.0	20	21	735	85	5		28	SW		
25	87	67	77	8	0	12	0.00	0.0	0	13.9	18	23	715	83	7		28	N		
26	71	58	65	-4	0	0	0.48	0.0	0	7.3	16	01	125	14	9 1		23	N		
27	83	56	70	1	0	5	0.00	0.0	0	6.6	10	28	689	80	4 1		16	NW		
28	86	61	74	4	0	9	0.00	0.0	0	14.2	20	22	842	97	3		28	SW		
29	88	64	76	6	0	11	0.22	0.0	0	11.9	16	03	493	57	9 3		25	NE		
30	70	58	64	-6	1	0	0.00	0.0	0	10.2	18	06	853	98	0		25	NE		
31	82	57	70	0	0	5	0.47	0.0	0	12.1	18	23	182	21	9 1.3		33	SW		
Sum	2437	1808			22	136	2.08	0.0		305.9			16803		176					
Avg	78.6	58.3								9.9	Fast	Dir.	Psb1	Z	5.7		Max (mph)			
										Misc ----->	210	22	26303	64			837	N		

Notes:

Last of several occurrences

Column 9 readings are taken at 0700

Column 17 Peak Wind in M.P.H.

Preliminary Local Climatological Data (WS Form: F-6). Page 2

Station: WSO. NORFOLK. VA
Month: MAY
Year: 1993

[Temperature Data]

Average Monthly: 68.5
Departure from Normal: +2.4
Highest: 89 on 12
Lowest: 46 on 1

[Precipitation Data]

Total for Month: 2.88
Departure from Normal: -0.93
Greatest in 24 hrs. 0.62 on 18-19

SNOWFALL, ICE PELLETS, HAIL
Total for month: 0.0 inches
Greatest snowfall in 24 hrs: 0.0 on
Greatest snow depth: on

SYMBOLS USED IN COLUMN 16

- 1 = FOG
- 2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
- 3 = THUNDER
- 4 = ICE PELLETS
- 5 = HAIL
- 6 = GLAZE OR RIME
- 7 = BLOWING DUST OR BLOWING SAND REDUCING VISIBILITY TO 1/2 MILE OR LESS
- 8 = SMOKE OR HAZE
- 9 = BLOWING SNOW
- 1 = TORNADO

[No. of Days with]

Max 32 or below: 0
Max 98 or above: 0
Min 32 or below: 0
Min 0 or below: 0

[WEATHER - No. of Days with]

0.01 inch or more Precip: 12
0.10 inch or more Precip: 9
0.50 inch or more Precip: 1
1.00 inch or more Precip: 0

[Heating Degree Days (Base 65)]

Total this Month: 22
Departure from Normal: -31
Seasonal Total: 3331
Departure from Normal: -115

Clear (scale 0-3) 10
Partly Cloudy (scale 4-7) 8
Cloudy (scale 8-10) 13

[Cooling Degree Days (Base 65)]

Total this Month: 136
Departure from Normal: +51
Seasonal Total: 159
Departure from Normal: +65

[Pressure Data]
Highest Sea-Level 30.34 in. on 3
Lowest Sea-Level 29.58 in. on 13

Maximum Precipitation

(Delta T) (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)	0.13	0.19	0.21	0.22	0.26	0.28	0.28	0.28	0.30	0.33	0.34	0.43
Ended Date	31	31	31	31	31	31	31	31	27	27	27	27
Time	1553	1556	1600	1606	1616	1631	1646	1706	0408	0408	0208	0508

KEYED BY 04849

13737

Preliminary Local Climatological Data (WS Form: F-6)

Station: WSO, NORFOLK, VA

Month: JUN

Year: 1993

Latitude				Longitude				Gnd Elev. 24 ft.				Std Time: EST							
+3654				+7612															
=====																			
Temperature in Fahrenheit : Precip(in.): Snow : Wind : Fastest 1-Min: Sunshine : Sky : Peak Wind																			
(<===== Columns =====>)																			
-1-	-2-	-3-	-4-	-5-	-6a-	-6b-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	
Day	Max	Min	Avg	Dep.	HDD	CDD	Water	Snow	Depth	Avg.	Speed	Dir	Mins.	TPSBL	SR-SS	Weather	Speed	Dir	
=====																			
1	71	54	63	-8	2	0	0.46	0.0	0	11.3	23	01	378	43	6 1		39	N	
2	73	51	62	-9	3	0	0.00	0.0	0	9.2	17	00	757	87	4 1		22	E	
3	77	62	70	-1	0	5	0.93	0.0	0	0.5	17	30	174	20	9 3,0		31	NW	
4	80	63	72	0	0	7	0.87	0.0	0	0.7	16	34	539	62	5 1,3,0		33	N	
5	89	63	76	4	0	11	0.22	0.0	0	9.5	20	36	600	69	5 1,3,0		28	N	
6	76	59	68	-4	0	3	0.00	0.0	0	12.9	20	36	733	84	4		33	N	
7	84	57	71	-1	0	6	0.00	0.0	0	10.1	15	24	802	92	7		25	SW	
8	91	70	81	0	0	16	0.00	0.0	0	11.0	18	23	392	45	9 1,3,0		23	SW	
9	96	77	87	14	0	22	0.00	0.0	0	11.0	16	24	717	82	6 0		26	SW	
10	97	70	80	15	0	23	0.00	0.0	0	10.1	15	20	806	92	1 0		21	SW	
11	86	73	80	7	0	15	T	0.0	0	0.9	16	20	660	75	7 3,0		30	N	
12	75	60	72	-1	0	7	0.00	0.0	0	11.5	17	06	305	35	9		23	NW	
13	73	66	70	-4	0	5	0.00	0.0	0	13.0	20	05	95	11	10		25	NE	
14	77	66	72	-2	0	7	0.00	0.0	0	12.3	18	07	321	36	7		26	NE	
15	85	65	75	1	0	10	0.00	0.0	0	9.7	15	19	459	52	7		25	S	
16	84	71	78	4	0	13	0.00	0.0	0	0.1	13	04	633	72	0		10	NE	
17	87	70	79	4	0	14	0.00	0.0	0	7.6	14	04	864	90	6		15	S	
18	94	70	82	7	0	17	0.00	0.0	0	11.0	14	21	617	70	6		21	SW	
19	96	74	85	10	0	20	0.00	0.0	0	11.5	15	22	621	70	1 0		21	SW	
20	96	75	86	11	0	21	0.00	0.0	0	11.3	16	23	672	76	1 0		23	SW	
21	90	72	81	6	0	16	T	0.0	0	11.9	17	22	320	36	9		22	SW	
22	90	73	82	6	0	17	T	0.0	0	11.4	17	20	666	76	6		23	N	
23	80	62	71	-5	0	6	0.00	0.0	0	10.0	17	36	862	90	0 0		23	N	
24	86	50	72	-4	0	7	0.00	0.0	0	7.7	13	04	865	90	0		16	NE	
25	86	60	73	-3	0	0	0.00	0.0	0	0.1	15	14	854	97	1		23	SE	
26	89	69	79	3	0	14	T	0.0	0	9.4	16	20	540	62	6		21	S	
27	82	69	76	0	0	11	0.18	0.0	0	7.6	15	01	469	53	7 1		17	N	
28	91	66	79	2	0	14	0.00	0.0	0	6.8	14	06	678	77	7 2,0		20	E	
29	95	71	83	6	0	10	0.13	0.0	0	9.5	17	20	605	69	6 1,0		23	N	
30	86	60	77	0	0	12	0.00	0.0	0	6.3	12	34	526	60	0 1,0		16	N	
=====																			
Sum	2562	2000			5	345	2.79	0.0		297.5			17538		160				
=====																			
Avg	85.4	66.7								9.9	Fast	Dir.	Psb1	2	5.6			Max (mph)	
											Misc ----->	23	01	26357	67			039	N

Notes:

Column 9 readings are taken at 0700

Column 17 Peak Wind in M.P.H.

Preliminary Local Climatological Data (WS Form: F-6), Page 2

Station: WSO, NORFOLK, VA
 Month: JUN
 Year: 1993

[Temperature Data]

Average Monthly: 76.1
 Departure from Normal: +2.0
 Highest: 97 on 10
 Lowest: 51 on 2

[Precipitation Data]

Total for Month: 2.79
 Departure from Normal: -1.83
 Greatest in 24 hrs. 1.76 on 3-4
 SNOWFALL, ICE PELLETS, HAIL
 Total for month: 0.0 inches
 Greatest snowfall in 24 hrs: on
 Greatest snow depth: on

SYMBOLS USED IN COLUMN 16

- 1 = FOG
- 2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
- 3 = THUNDER
- 4 = ICE PELLETS
- 5 = HAIL
- 6 = GLAZE OR RIME
- 7 = BLOWING DUST OR BLOWING SAND REDUCING VISIBILITY TO 1/2 MILE OR LESS
- 8 = SMOKE OR HAZE
- 9 = BLOWING SNOW
- 1 = TORNADO

[No. of Days with]

Max 32 or below: 0
 Max 90 or above: 10
 Min 32 or below: 0
 Min 0 or below: 0

[WEATHER - No. of Days with]

0.01 inch or more Precip: 7
 0.10 inch or more Precip: 6
 0.50 inch or more Precip: 2
 1.00 inch or more Precip: 0

[Heating Degree Days (Base 65)]

Total this Month: 5
 Departure from Normal: +5
 Seasonal Total: 3336
 Departure from Normal: -118

Clear (scale 0-3) 6
 Partly Cloudy (scale 4-7) 17
 Cloudy (scale 8-10) 7

[Cooling Degree Days (Base 65)]

Total this Month: 345
 Departure from Normal: +68
 Seasonal Total: 584
 Departure from Normal: +133

[Pressure Data]
 Highest Sea-Level 30.31 in. on 25
 Lowest Sea-Level 29.75 in. on 4

Maximum Precipitation

<Delta T> (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)	0.23	0.40	0.56	0.75	0.88	0.89	0.91	1.12	1.12	1.14	1.24	1.25
Ended Date	3	3	3	3	3	4	4	4	4	4	4	4
Time	2335	2340	2345	2350	2356	7	22	42	102	122	152	222

KEYED BY 04040

X

13737

Preliminary Local Climatological Data (WS Form: F-6)

KEYED BY 04849

Station: WSO, NORFOLK, VA
Month: JUL
Year: 1993

Latitude +3654 Longitude +7612 Gnd Elev. 24 ft. Std Time: EST

Temperature in Fahrenheit										Precip(in.)	Snow	Wind	Fastest 1-Min:	Sunshine	Sky	: Peak Wind		
										Columns								
-1-	-2-	-3-	-4-	-5-	-6a-	-6b-	-7-	-8-	-9-	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-
Day	Max	Min	Avg	Dep.	HDD	CDD	Water	Snow	Depth	Avg.	Speed	Dir	Mins.	XPSBL	SR-SS	Weather	Speed	Dir
1	84	78	77	8	0	12	0.00	0.0	0	9.5	28	85	489	56	5 1,8	24	NE	
2	88	74	81	4	0	16	T	0.0	0	7.1	13	19	278	31	10 8	25	S	
3	95	74	85	8	0	28	0.27	0.0	0	9.4	14	27	484	46	7 1,3,8	29	SW	
4	89	74	82	5	0	17	0.82	0.0	0	6.6	18	26	588	66	8 8	18	SW	
5	94	75	85	8	0	28	0.80	0.0	0	5.7	89	84	733	94	1 1,8	14	NE	
6	95	75	85	7	0	28	0.80	0.0	0	7.1	12	17	471	54	3 1,3	17	SE	
7	96	77	87	9	0	22	T	0.0	0	8.3	13	22	453	52	4 3,6	29	E	
8	100	78	89	11	0	24	0.80	0.0	0	8.9	14	28	784	81	3 8	22	W	
9	98	79	89	11	0	24	0.80	0.0	0	7.3	18	34	788	81	1 6	17	SW	
10	99	77	88	10	0	23	0.84	0.0	0	8.9	30	31	649	74	2 3,8	47	NW	
11	97	77	87	9	0	22	0.80	0.0	0	7.8	18	28	795	91	1 8	16	NE	
12	98	79	89	11	0	24	0.80	0.0	0	8.2	14	28	719	83	3	18	NW	
13	95	79	87	9	0	22	0.80	0.0	0	7.2	14	84	537	62	5 3,8	25	S	
14	101	75	88	10	0	23	0.80	0.0	0	8.5	14	23	676	78	4 8	23	SW	
15	92	79	86	8	0	21	T	0.0	0	8.6	14	36	298	34	9 8	23	W	
16	87	73	80	2	0	15	0.80	0.0	0	9.1	16	85	732	85	5 8	23	N	
17	85	69	77	-1	0	12	0.80	0.0	0	8.3	17	84	791	92	4	23	NE	
18	98	67	79	1	0	14	0.80	0.0	0	7.3	14	12	765	89	4	18	SE	
19	98	77	84	3	0	19	0.81	0.0	0	11.5	17	19	155	18	9	28	S	
20	91	78	85	6	0	20	0.80	0.0	0	9.5	14	81	588	58	4 1,8	21	SW	
21	89	77	83	4	0	18	0.80	0.0	0	8.8	14	84	737	86	4 8	24	NE	
22	85	68	77	-2	0	12	0.80	0.0	0	6.9	15	84	582	59	7 1,3	21	NE	
23	86	66	76	-3	0	11	0.80	0.0	0	6.8	12	86	361	42	9	16	NE	
24	98	74	82	3	0	17	T	0.0	0	7.8	28	18	247	29	8 1,3,3	29	S	
25	87	76	82	3	0	17	0.82	0.0	0	6.1	14	87	188	22	8 1,8	17	E	
26	88	75	82	3	0	17	0.80	0.0	0	8.8	14	13	392	46	7	22	SE	
27	89	76	83	4	0	18	0.80	0.0	0	10.4	18	24	295	35	8	25	SW	
28	94	76	85	6	0	28	0.80	0.0	0	8.6	12	36	767	98	2 8	28	N	
29	103	79	91	12	0	26	0.80	0.0	0	10.2	16	28	644	76	5 8	25	SW	
30	93	74	84	6	0	19	0.80	0.0	0	8.5	17	36	482	57	3	26	N	
31	85	73	79	1	0	14	0.80	0.0	0	9.8	16	36	488	58	5	25	N	
Sun	2853	2328			0	579	0.36	0.0		256.7			16532		158			
Avg	92.8	74.8								8.3	Fast	Dir.	Psbl	Z	S.1		Max (mph)	
										Misc	38	31	25792	62			247 NW	

Notes:
Column 9 readings are taken at 0700
Column 17 Peak Wind in M.P.H.

Preliminary Local Climatological Data (WS Form: F-6), Page 2.

Station: WSO, NORFOLK, VA

Month: JUL

Year: 1993

[Temperature Data]

Average Monthly: 83.4
Departure from Normal: +5.2
Highest: 103 on 29
Lowest: 66 on 23

[Precipitation Data]

Total for Month: 8.36
Departure from Normal: -4.78
Greatest in 24 hrs. 0.29 on 3-4

SNOWFALL, ICE PELLETS, HAIL

Total for month: 0.8 inches

Greatest snowfall in 24 hrs: on

Greatest snow depth: on

SYMBOLS USED IN COLUMN 16

- 1 = FOG
- 2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
- 3 = THUNDER
- 4 = ICE PELLETS
- 5 = HAIL
- 6 = GLAZE OR RIME
- 7 = BLOWING DUST OR BLOWING SAND REDUCING VISIBILITY TO 1/2 MILE OR LESS
- 8 = SMOKE OR HAZE
- 9 = BLOWING SNOW
- X = TORNADO

[No. of Days with]

Max 32 or below: 0
Max 90 or above: 19
Min 32 or below: 0
Min 0 or below: 0

[WEATHER - No. of Days with]

0.01 inch or more Precip: 5
0.10 inch or more Precip: 1
0.50 inch or more Precip: 0
1.00 inch or more Precip: 0

[Heating Degree Days (Base 65)]

Total this Month: 0
Departure from Normal: 0
Seasonal Total: 0
Departure from Normal: 0

Clear (scale 0-3) 9
Partly Cloudy (scale 4-7) 14
Cloudy (scale 8-10) 8

[Cooling Degree Days (Base 65)]

Total this Month: 579
Departure from Normal: +170
Seasonal Total: 1083
Departure from Normal: +303

[Pressure Data]

Highest Sea-Level 30.13 in. on 18
Lowest Sea-Level 29.75 in. on 29

Maximum Precipitation

<Delta T> (Minutes)	5	10	15	20	30	45	60	80	100	120	150	180
Precipitation (Inches)	0.03	0.04	0.05	0.06	0.08	0.12	0.14	0.18	0.21	0.24	0.26	0.27
Ended Date	3	3	3	3	3	3	3	3	3	3	4	4
Time	2203	2204	2209	2214	2224	2239	2253	2313	2333	2353	9	39

KEYED BY 04940

DRIEST JULY ON RECORD. SECOND WARMEST JULY ON RECORD.

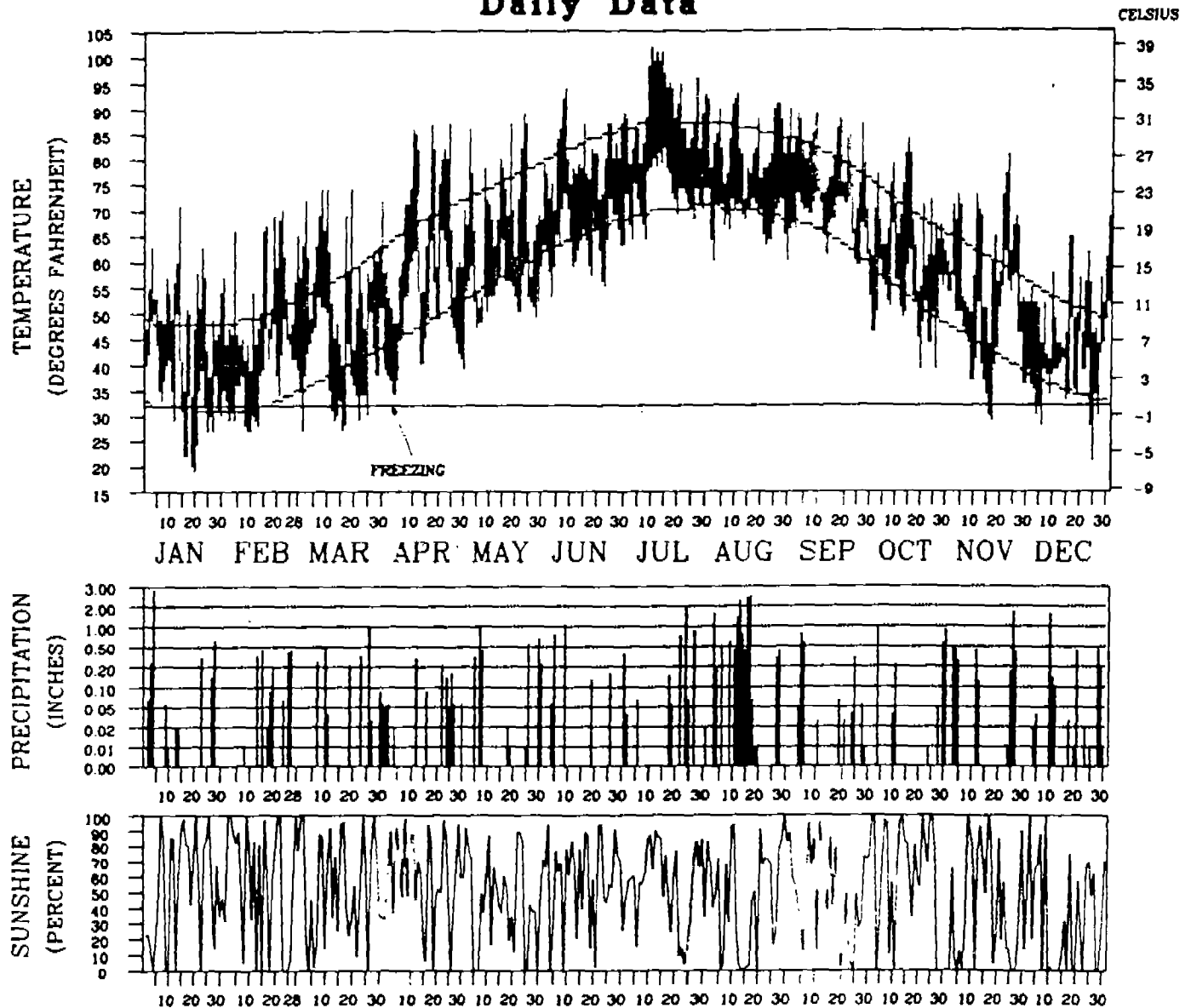
1992 LOCAL CLIMATOLOGICAL DATA

ANNUAL SUMMARY WITH COMPARATIVE DATA

NORFOLK, VIRGINIA



Daily Data



TEMPERATURE DEPICTS NORMAL MAXIMUM, NORMAL MINIMUM AND ACTUAL DAILY HIGH AND LOW VALUES (FAHRENHEIT)
 PRECIPITATION IS MEASURED IN INCHES. SCALE IS NON-LINEAR
 SUNSHINE IS PERCENT OF THE POSSIBLE SUNSHINE

I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AND IS COMPILED FROM RECORDS ON FILE AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE, NORTH CAROLINA, 28801

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AND INFORMATION SERVICE

NATIONAL
CLIMATIC DATA CENTER
ASHEVILLE, NORTH CAROLINA

Kenneth D. Hallen
 DIRECTOR
 NATIONAL CLIMATIC DATA CENTER

METEOROLOGICAL DATA FOR 1992

NORFOLK, VIRGINIA

LATITUDE: 36°54' N		LONGITUDE: 76°12' W		ELEVATION: FT. GRND		24 BARO		44 TIME ZONE: EASTERN		WBAN: 13737			
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F:													
Averages													
-Daily Maximum	51.1	53.1	58.8	68.1	70.7	80.6	90.4	83.2	80.2	67.6	51.8	51.8	68.1
-Daily Minimum	34.3	36.8	38.7	48.1	54.0	63.3	73.2	68.0	66.8	51.7	37.4	37.4	51.5
-Monthly	42.7	45.0	48.8	58.1	62.4	72.0	81.8	75.6	73.5	59.7	44.6	44.6	59.8
-Monthly Dmpt.	31.9	33.9	34.1	44.1	52.5	61.8	70.2	67.6	64.8	49.1	35.3	35.8	49.3
Extremes													
-Highest	71	70	74	87	89	94	102	93	89	84	81	69	102
-Date	14	22	19	31	23	8	10	11	18	15	23	31	JUL 10
-Lowest	19	27	27	34	47	53	64	60	53	39	29	21	19
-Date	20	10	16	11	5	3	8	30	30	26	17	25	JAN 20
DEGREE DAYS BASE 65 °F:													
Heating	686	575	496	262	125	1	0	0	9	179	337	623	3293
Cooling	0	0	0	63	51	220	527	336	270	23	9	0	1499
% OF POSSIBLE SUNSHINE													
	52	57	53	53	44	59	54	48	48	60	40	34	51
AVG. SKY COVER (tenths)													
Sunrise - Sunset	6.5	6.2	6.0	5.7	6.6	6.4	6.1	6.7	7.0	4.9	5.7	7.7	6.4
Midnight - Midnight	6.2	5.5	5.7	5.3	6.5	6.3	5.8	6.5	6.5	4.7	5.3	7.2	6.1
NUMBER OF DAYS:													
Sunrise to Sunset	8	7	8	12	4	6	7	4	4	15	8	5	83
Clear	6	7	10	12	14	11	11	13	13	6	6	4	113
Partly Cloudy	17	15	13	12	13	13	13	14	13	10	16	22	170
Cloudy													
Precipitation													
0.1 inches or more	10	9	9	11	9	5	10	16	10	7	9	13	118
Snow, Ice pellets, hail													
1.0 inches or more	0	0	0	0	0	0	0	0	0	0	0	0	0
Thunderstorms	0	1	2	3	2	2	10	7	3	1	1	0	32
Heavy Fog, visibility													
1/4 mile or less	1	4	2	2	2	0	0	0	3	3	3	3	23
Temperature of													
-Maximum													
90° and above	0	0	0	0	0	2	15	8	0	0	0	0	25
32° and below	0	0	0	0	0	0	0	0	0	0	0	0	0
-Minimum													
32° and below	13	9	8	1	0	0	0	0	0	0	2	6	39
0° and below	0	0	0	0	0	0	0	0	0	0	0	0	0
AVG. STATION PRESS. (mb)													
	1015.6	1015.9	1014.6	1015.6	1016.9	1012.9	1014.2	1018.0	1019.3	1018.0	1020.0	1019.6	1016.6
RELATIVE HUMIDITY (%)													
Hour 01	74	74	65	76	85	86	83	90	86	80	81	77	80
Hour 07	77	77	73	74	81	80	82	86	84	80	80	78	79
Hour 13 (Local Time)	57	59	50	48	61	59	55	63	63	56	60	64	58
Hour 19	68	67	60	60	70	67	70	77	78	74	76	72	70
PRECIPITATION (inches):													
Water Equivalent													
-Total	4.48	2.07	2.63	1.26	3.46	2.22	4.52	14.32	2.06	2.85	4.26	3.15	47.28
-Greatest (24 hrs)	3.14	0.82	1.05	0.32	1.32	1.04	2.01	2.59	1.42	1.54	1.95	1.76	3.14
-Date	3-4	25-26	26	12	7-8	9	24	17-18	5-6	30-31	25-26	10-11	JAN 3-4
Snow, Ice pellets, hail													
-Total	T	0.0	T	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T
-Greatest (24 hrs)	T	0.0	T	T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	T
-Date	19		27	5									APR 5
WIND:													
Resultant													
-Direction (!!!)	286	339	287	195	049	103	221	105	044	001	022	315	354
-Speed (mph)	2.9	3.3	1.4	1.7	5.7	1.4	4.4	0.9	4.0	2.2	1.6	3.6	1.0
Average Speed (mph)	11.1	11.3	11.8	11.5	11.2	8.4	9.3	7.0	10.5	9.8	9.2	10.9	10.2
Fastest Obs. 1 Min.													
-Direction (!!!)	30	36	26	24	05	36	27	18	04	04	21	32	26
-Speed (mph)	29	29	37	23	32	21	35	28	32	35	25	32	37
-Date	16	29	27	24	7	22	27	28	24	5	12	24	MAR 27
Peak Gust													
-Direction (!!!)	W	N	W	SW	NE	N	W	SW	NE	NE	N	NW	NE
-Speed (mph)	47	40	55	44	45	29	48	48	55	49	41	48	55
-Date	14	29	27	24	7	21	18	28	25	5	5	24	SEP 25

!!! See Reference Notes on Page 68
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NORMALS, MEANS, AND EXTREMES

NORFOLK, VIRGINIA

LATITUDE: 36°54'N LONGITUDE: 76°22'W ELEVATION: FT. GRND 24 BARO 44 TIME ZONE: EASTERN WBAN: 13737

		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE °F:														
Normals														
-Daily Maximum		48.1	45.9	57.5	68.2	75.7	83.2	86.9	85.7	90.2	69.8	60.8	51.9	68.2
-Daily Minimum		31.7	32.3	39.4	48.1	57.2	65.3	69.9	69.6	64.2	52.8	43.0	35.0	50.7
-Monthly		39.9	41.1	48.5	58.2	66.4	74.3	78.4	77.7	72.2	61.3	51.9	43.5	59.5
Extremes														
-Record Highest	44	78	81	88	97	100	101	103	104	99	95	86	80	104
-Year		1970	1969	1990	1960	1991	1964	1952	1980	1983	1954	1974	1991	AUG 1980
-Record Lowest	44	-3	-8	18	28	36	45	54	49	45	27	20	7	-3
-Year		1985	1965	1980	1982	1966	1967	1979	1982	1967	1976	1950	1983	JAN 1985
NORMAL DEGREE DAYS:														
Heating (base 65°F)		778	669	512	219	53	0	0	0	9	146	393	667	3446
Cooling (base 65°F)		0	0	0	15	96	282	415	394	225	31	0	0	1458
% OF POSSIBLE SUNSHINE	28	55	57	61	63	63	67	63	62	62	60	57	56	61
MEAN SKY COVER (tenths)														
Sunrise - Sunset	44	6.3	6.2	6.1	5.8	6.1	5.8	6.0	5.9	5.7	5.4	5.5	6.1	5.9
MEAN NUMBER OF DAYS:														
Sunrise to Sunset	44	9.0	8.1	8.9	8.8	7.8	7.6	7.4	7.7	9.0	11.7	10.4	9.3	105.5
-Clear	44	6.6	5.2	7.6	9.2	10.0	11.8	11.8	12.0	9.6	7.1	8.0	7.0	106.9
-Partly Cloudy	44	15.5	13.9	14.5	12.0	13.2	10.7	11.8	11.3	11.4	12.2	11.6	14.7	152.9
-Cloudy	44	10.5	10.3	10.9	10.0	9.9	9.2	11.2	10.6	7.9	7.5	8.0	9.1	115.1
Precipitation	44	0.8	1.7	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.0
.01 inches or more	44	0.4	0.7	1.9	2.8	4.8	5.8	8.4	7.0	2.6	1.3	0.5	0.4	36.5
Snow, Ice pellets, hail	44	2.2	2.6	1.9	1.4	1.9	1.0	0.5	1.1	1.2	2.3	1.8	2.2	20.2
1.0 inches or more	44	0.0	0.0	0.0	0.5	1.6	6.6	11.7	8.8	2.8	0.1	0.0	0.0	32.1
Thunderstorms	44	2.6	2.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.9
Heavy Fog Visibility	44	16.5	14.1	6.2	0.3	0.0	0.0	0.0	0.0	0.0	0.1	3.1	13.3	53.6
1/4 mile or less	44	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2
Temperature °F														
-Maximum	44	0.0	0.0	0.0	0.5	1.6	6.6	11.7	8.8	2.8	0.1	0.0	0.0	32.1
90° and above	44	2.6	2.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.9
32° and below	44	16.5	14.1	6.2	0.3	0.0	0.0	0.0	0.0	0.0	0.1	3.1	13.3	53.6
-Minimum	44	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2
32° and below	44	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2
0° and below	44	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2
AVG. STATION PRESS (mb)														
	20	1018.3	1015.0	1016.4	1015.0	1015.0	1015.0	1015.7	1016.7	1017.6	1018.7	1018.8	1019.3	1017.1
RELATIVE HUMIDITY (%)														
Hour 01	44	73	72	72	73	81	83	84	86	84	82	76	73	78
Hour 07 (Local Time)	44	74	74	74	73	77	79	82	84	83	82	79	75	78
Hour 13	44	58	56	54	50	56	56	59	61	61	59	56	58	57
Hour 19	44	67	66	62	61	66	67	70	74	75	74	70	68	68
PRECIPITATION (inches):														
Water Equivalent														
-Normal		3.72	2.26	3.86	2.87	3.75	3.45	5.15	5.33	4.35	3.41	2.88	3.17	45.22
-Maximum Monthly	44	9.93	6.23	8.50	7.25	10.12	9.72	13.73	14.32	13.80	10.12	7.01	6.10	14.32
-Year		1987	1989	1989	1984	1979	1963	1975	1992	1979	1971	1951	1983	AUG 1992
-Minimum Monthly	44	1.05	0.34	0.75	0.43	0.64	0.37	0.77	0.74	0.26	0.57	0.49	0.67	0.26
-Year		1981	1981	1986	1985	1991	1954	1983	1975	1986	1984	1965	1988	SEP 1986
-Maximum in 24 hrs	44	3.80	3.18	5.90	3.41	6.85	5.64	11.40	11.40	7.79	4.38	3.35	2.76	11.40
-Year		1967	1958	1991	1980	1963	1969	1964	1964	1959	1971	1952	1983	AUG 1964
Snow, Ice pellets, hail														
-Maximum Monthly	44	14.2	12.4	13.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.6	14.7	24.4
-Year		1966	1980	1964	1964	1990	1990	1990	1990	1990	1990	1950	1958	FEB 1989
-Maximum in 24 hrs	44	9.1	9.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	11.4	14.2
-Year		1973	1980	1980	1964	1990	1990	1990	1990	1990	1990	1950	1958	FEB 1989
WIND:														
Mean Speed (mph)	44	11.5	11.9	12.5	11.8	10.5	9.8	9.0	8.8	9.7	10.3	10.6	11.1	10.6
Prevailing Direction		SW	NE	SW	SW	SW	SW	SW	SW	NE	NE	SW	SW	SW
through 1963														
Fastest Obs. 1 Min.		23	24	22	02	28	30	34	35	30	04	21	01	04
-Direction (°)	20	39	24	46	41	38	46	46	46	46	48	40	39	48
-Speed (MPH)	20	1978	1973	1973	1990	1989	1977	1973	1979	1985	1982	1989	1989	OCT 1982
-Year														
Peak Gust														
-Direction (°)	9	N	N	N	N	NW	SW	N	E	NW	N	E	N	N
-Speed (mph)	9	58	62	56	66	69	63	63	67	69	55	53	69	69
-Date		1987	1989	1990	1984	1987	1986	1986	1986	1985	1990	1985	1989	OCT 1990

PRECIPITATION (inches)

NORFOLK, VIRGINIA

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
1963	36	3.75	2.98	1.29	1.55	9.42	2.01	2.40	6.84	1.21	5.31	2.85	43.27
1964	56	4.56	2.26	2.38	1.56	2.00	7.33	10.58	12.26	5.55	1.14	2.95	57.71
1965	73	2.53	2.83	2.24	1.48	4.00	3.46	3.08	0.77	1.29	0.49	1.08	26.67
1966	86	3.83	1.50	1.68	5.95	1.00	4.26	5.24	3.39	1.25	1.05	3.13	37.96
1967	44	3.56	1.34	1.31	3.25	1.00	7.21	11.19	3.02	0.93	1.75	4.84	45.21
1968	62	2.01	4.76	3.17	2.16	3.00	4.23	2.04	1.51	4.44	3.56	3.14	37.71
1969	26	2.16	4.88	2.07	2.05	4.00	12.70	5.28	2.72	3.18	2.97	3.93	48.33
1970	27	3.97	3.37	3.19	2.58	4.00	5.33	2.04	1.72	1.30	2.34	3.01	35.22
1971	03	3.59	3.88	2.18	4.46	2.00	4.81	4.63	5.46	10.12	0.97	1.44	47.73
1972	94	3.50	2.55	2.15	3.35	4.00	4.65	1.60	6.91	4.09	5.44	4.12	46.23
1973	54	3.21	4.69	3.44	3.62	5.00	4.19	7.92	0.86	1.37	1.90	5.83	45.50
1974	52	2.98	5.16	3.34	3.74	4.00	5.47	8.33	4.40	1.23	1.22	3.81	47.96
1975	18	4.18	5.72	4.19	3.37	1.00	13.73	0.74	4.82	3.19	1.63	3.62	50.53
1976	51	1.50	2.21	0.99	3.74	1.00	5.19	2.62	3.51	2.90	2.38	3.22	32.36
1977	33	2.23	4.05	2.20	3.86	2.00	2.70	4.57	3.00	6.09	5.41	3.92	43.77
1978	32	1.91	7.80	2.90	5.64	7.00	4.19	1.66	1.17	1.50	4.40	2.31	47.64
1979	47	5.01	5.13	7.00	10.12	2.00	4.69	1.79	13.80	1.74	5.26	0.98	64.96
1980	54	2.91	4.40	3.25	5.17	1.00	1.85	4.54	1.47	4.21	2.01	2.64	38.38
1981	05	2.26	1.88	2.26	2.75	5.00	5.10	6.87	3.18	3.28	1.78	5.77	41.18
1982	35	5.81	3.04	1.71	3.07	4.00	5.83	6.51	3.63	4.25	3.43	4.30	49.15
1983	21	6.23	4.55	6.13	3.52	3.00	0.77	3.07	4.52	5.29	3.24	6.10	49.47
1984	77	4.66	5.09	7.25	6.23	1.00	7.66	2.25	1.94	0.57	2.68	2.22	44.82
1985	98	3.53	2.02	0.43	3.23	6.00	6.14	1.89	6.36	3.92	5.71	0.79	44.81
1986	52	2.71	0.75	3.31	1.41	1.00	2.59	4.80	0.26	1.67	1.21	3.74	26.48
1987	93	3.11	2.30	3.83	2.65	2.00	3.20	2.04	7.00	1.81	3.51	2.33	44.69
1988	12	2.70	2.11	3.53	5.49	3.00	2.93	5.69	1.74	2.85	4.02	0.67	38.68
1989	70	5.80	8.50	3.62	2.97	5.00	4.86	7.49	5.10	2.94	3.69	3.86	56.63
1990	26	2.93	3.49	3.55	3.79	3.00	4.06	11.85	1.00	3.73	1.68	2.67	45.52
1991	74	0.84	4.70	6.39	0.64	4.00	6.46	3.77	2.04	4.65	1.72	2.43	42.92
1992	48	2.07	2.63	1.26	3.46	2.00	4.52	14.32	2.06	2.85	4.26	3.15	47.28
Record Mean	36	3.35	3.74	3.24	3.69	3.55	5.58	5.38	3.83	3.13	2.67	3.19	45.14

See Reference Notes on Page 68.
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AVERAGE TEMPERATURE (deg. F)

NORFOLK, VIRGINIA

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	ANNUAL
1963	35.1	35.7	53.4	60.3	64.6	73.2	77.0	76.7	66.7	60.1	52.0	35.2	57.7
1964	36.3	39.9	49.5	55.2	66.4	74.4	77.3	74.4	70.8	57.7	46.5	59.1	59.1
1965	37.7	41.0	44.4	54.5	69.7	72.0	76.7	77.1	73.6	59.0	51.6	43.5	58.6
1966	38.8	38.6	47.9	54.5	63.6	71.0	78.0	74.9	69.9	59.3	50.5	41.4	57.1
1967	40.7	39.9	47.7	58.0	61.2	71.0	76.3	75.2	66.5	58.7	45.9	44.0	57.5
1968	44.8	34.0	50.0	55.1	64.6	74.0	78.0	80.5	71.5	63.1	52.9	41.4	58.4
1969	48.5	39.8	44.7	59.8	67.4	77.0	79.2	76.2	71.1	62.2	49.1	40.9	58.9
1970	49.9	39.3	44.7	56.7	67.5	74.0	76.9	78.0	74.7	63.7	51.7	47.0	59.1
1971	48.6	44.7	46.9	55.9	65.0	76.0	77.2	75.7	73.2	66.7	52.4	52.3	60.4
1972	48.4	43.2	49.0	56.4	63.5	70.0	77.6	75.8	71.9	59.2	51.6	49.2	59.5
1973	45.5	39.7	52.3	58.5	66.9	76.0	78.3	78.5	75.0	64.2	53.5	46.2	60.9
1974	48.6	43.4	53.1	60.8	66.8	72.0	78.3	77.4	71.4	58.7	53.5	46.0	60.9
1975	48.0	45.4	47.4	52.7	68.3	77.0	78.6	79.6	72.3	63.4	55.7	43.2	60.8
1976	49.9	49.9	53.4	61.9	66.3	75.0	78.2	75.9	71.1	57.7	45.9	41.4	59.7
1977	49.2	41.5	54.7	61.9	68.2	74.0	81.4	81.0	76.3	60.5	54.8	43.5	60.6
1978	37.0	32.6	46.1	57.2	65.6	74.0	76.1	80.5	73.2	60.8	56.0	45.3	58.7
1979	43.4	33.3	49.1	58.1	66.7	70.4	77.1	78.5	72.8	60.4	56.4	44.9	58.9
1980	40.3	34.7	46.5	58.6	67.8	73.9	80.9	80.9	76.1	60.4	49.9	42.3	59.4
1981	42.7	43.1	45.4	61.2	65.1	78.0	79.8	75.1	70.7	59.6	50.7	41.0	58.6
1982	40.4	42.0	48.8	55.0	69.4	73.4	78.6	75.3	70.0	60.2	54.4	48.8	59.3
1983	41.2	40.8	51.0	55.7	65.8	73.0	80.3	79.0	72.8	62.7	52.6	41.6	59.6
1984	43.5	46.7	45.4	55.6	67.8	76.0	76.7	78.4	70.5	66.9	49.9	50.9	60.0
1985	43.9	40.4	51.8	62.0	68.8	74.0	78.2	77.2	73.4	65.9	60.3	41.2	60.7
1986	43.9	42.1	49.9	57.3	67.6	76.0	82.1	76.6	72.4	65.4	54.9	44.8	60.7
1987	43.6	38.7	47.5	54.6	68.3	77.0	82.4	79.6	74.3	56.6	54.3	46.0	59.9
1988	43.3	42.5	49.5	56.5	65.8	73.6	80.1	80.8	70.5	56.9	54.2	42.4	59.2
1989	43.3	43.6	50.1	56.3	65.6	78.0	79.2	77.7	73.9	62.7	53.3	24.8	60.1
1990	43.3	50.2	53.2	58.7	66.6	75.0	80.6	78.0	71.6	65.9	55.0	50.5	62.8
1991	43.5	46.0	52.7	61.6	72.8	78.0	82.0	79.5	72.3	61.9	52.7	47.6	62.4
1992	43.7	45.0	48.8	58.2	62.4	72.0	81.8	75.6	73.5	59.7	53.8	44.6	59.8
Record Mean	41.2	42.2	48.9	57.5	66.8	74.1	78.8	77.6	72.5	62.1	52.3	43.7	59.8
Max	48.0	50.5	57.8	66.9	75.8	83.3	86.9	85.1	79.8	69.9	60.3	51.4	68.1
Min	32.3	33.9	40.0	48.1	57.7	66.0	70.6	70.0	65.1	54.3	44.2	35.9	51.6

See Reference Notes on Page 68.
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HEATING DEGREE DAYS Base 65 deg. F

NORFOLK, VIRGINIA

SEASON	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	TOTAL
1963-64	0	0	44	156	384	920	697	719	482	303	108	4	3817
1964-65	0	0	4	232	312	575	780	667	635	320	29	15	3569
1965-66	0	6	1	195	398	657	897	734	527	330	121	21	3887
1966-67	0	0	22	191	437	725	588	699	533	244	157	21	3617
1967-68	0	0	36	211	566	644	928	893	471	294	88	0	4133
1968-69	0	0	0	124	361	726	814	697	624	192	44	0	3582
1969-70	0	0	0	131	469	741	960	714	622	263	57	0	3965
1970-71	0	0	16	93	393	552	812	567	555	269	69	0	3326
1971-72	0	0	3	27	391	390	572	628	494	272	81	11	2869
1972-73	0	0	4	197	406	486	752	703	403	217	47	0	3215
1973-74	0	0	0	83	353	575	504	599	377	183	63	0	2737
1974-75	0	0	16	213	371	584	584	547	541	382	47	0	3285
1975-76	0	0	6	98	290	671	804	443	362	186	62	6	2928
1976-77	0	0	0	245	566	726	1104	657	330	150	40	1	3819
1977-78	0	0	0	158	321	661	860	902	580	235	72	3	3792
1978-79	0	0	3	162	268	614	787	879	499	213	52	5	3482
1979-80	0	0	0	190	272	616	759	872	564	196	58	2	3529
1980-81	0	0	11	181	449	699	994	610	605	159	96	0	3804
1981-82	0	0	12	189	423	739	907	636	495	303	21	0	3725
1982-83	0	4	6	177	334	498	762	674	426	295	85	3	3264
1983-84	0	0	27	126	370	718	908	522	601	281	54	3	3610
1984-85	0	0	16	37	450	432	928	686	421	172	21	0	3163
1985-86	0	0	6	61	162	731	790	637	465	228	69	1	3150
1986-87	0	1	8	88	311	620	779	730	538	306	58	0	3439
1987-88	0	0	0	252	320	582	851	646	474	266	86	15	3492
1988-89	0	0	2	265	324	692	602	601	486	282	80	0	3334
1989-90	0	0	12	134	356	928	541	417	410	234	39	3	3074
1990-91	0	0	13	102	301	444	657	527	386	166	19	2	2617
1991-92	0	0	22	132	377	542	686	575	496	262	125	1	3218
1992-93	0	0	9	179	337	623							

See Reference Notes on Page 5B.
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COOLING DEGREE DAYS Base 65 deg. F

NORFOLK, VIRGINIA

YEAR	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
1969	0	0	0	42	125	369	446	351	199	49	0	0	1587
1970	1	0	0	19	140	303	374	411	311	60	0	0	1620
1971	0	3	0	3	76	336	383	343	259	87	23	5	1518
1972	0	0	8	20	40	183	398	343	217	22	10	2	1243
1973	0	0	16	27	112	363	420	424	307	64	17	1	1751
1974	3	0	16	64	124	244	419	390	213	26	32	0	1531
1975	2	0	0	22	157	366	429	460	233	55	17	0	1744
1976	1	1	11	102	110	337	417	341	193	27	0	0	1558
1977	0	4	16	66	145	289	515	502	347	24	22	0	1930
1978	0	0	0	9	96	286	352	481	251	36	3	9	1535
1979	0	0	11	13	112	171	385	420	239	54	22	0	1433
1980	0	0	0	11	153	274	499	420	351	45	1	1	1832
1981	0	0	0	51	103	407	468	320	189	29	0	0	1567
1982	0	0	1	8	166	257	428	331	164	38	2	4	1419
1983	0	0	0	21	115	250	481	444	265	62	4	0	1638
1984	0	0	0	5	146	345	368	422	188	102	5	2	1587
1985	0	5	20	91	146	284	419	388	267	97	28	0	1739
1986	0	0	2	2	153	343	537	360	237	109	15	0	1765
1987	0	0	0	2	168	364	544	461	285	0	7	0	1831
1988	0	0	1	18	118	280	477	498	173	17	10	0	1592
1989	0	9	30	31	106	412	447	398	286	69	10	0	1799
1990	0	8	52	51	98	324	489	400	168	137	8	5	1797
1991	0	0	13	71	269	347	534	456	248	43	18	11	2010
1992	0	0	0	63	51	220	527	336	270	23	9	0	1499

See Reference Notes on Page 5B.
Page 5B

SNOWFALL (inches)

NORFOLK, VIRGINIA

SEASON	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	TOTAL
1963-64	0.0	0.0	0.0	0.0	0.0	T	T	5.8	0.0	1.2	0.0	0.0	8.0
1964-65	0.0	0.0	0.0	0.0	T	0.0	10.6	3.9	0.0	0.0	0.0	0.0	14.5
1965-66	0.0	0.0	0.0	0.0	0.0	T	14.2	0.5	0.0	0.0	0.0	0.0	14.7
1966-67	0.0	0.0	0.0	0.0	T	1.0	4.2	5.1	0.0	0.0	0.0	0.0	10.3
1967-68	0.0	0.0	0.0	0.0	T	2.0	1.5	2.9	0.9	0.0	0.0	0.0	7.3
1968-69	0.0	0.0	0.0	0.0	T	3.8	T	0.8	0.9	0.0	0.0	0.0	6.5
1969-70	0.0	0.0	0.0	0.0	0.0	T	3.0	2.8	0.0	0.0	0.0	0.0	5.8
1970-71	0.0	0.0	0.0	0.0	T	T	T	2.4	4.2	T	0.0	0.0	6.6
1971-72	0.0	0.0	0.0	0.0	T	T	0.0	1.8	T	T	0.0	0.0	1.8
1972-73	0.0	0.0	0.0	0.0	T	0.0	9.1	4.7	T	0.0	0.0	0.0	13.8
1973-74	0.0	0.0	0.0	0.0	0.0	1.4	T	0.9	0.5	0.0	0.0	0.0	9.8
1974-75	0.0	0.0	0.0	0.0	0.0	T	0.3	T	0.0	T	0.0	0.0	1.1
1975-76	0.0	0.0	0.0	0.0	0.0	T	T	T	0.0	0.0	0.0	0.0	T
1976-77	0.0	0.0	0.0	0.0	T	1.0	4.7	1.4	0.0	0.0	0.0	0.0	7.1
1977-78	0.0	0.0	0.0	0.0	0.0	T	1.3	9.2	2.3	0.0	0.0	0.0	12.8
1978-79	0.0	0.0	0.0	0.0	0.0	0.0	1.0	12.7	T	0.0	0.0	0.0	13.7
1979-80	0.0	0.0	0.0	0.0	0.0	0.0	9.3	18.9	3.7	0.0	0.0	0.0	41.9
1980-81	0.0	0.0	0.0	0.0	0.0	T	T	0.0	0.3	0.0	0.0	0.0	0.3
1981-82	0.0	0.0	0.0	0.0	0.0	1.8	4.2	0.1	T	T	0.0	0.0	6.1
1982-83	0.0	0.0	0.0	0.0	0.0	0.4	T	3.0	T	T	0.0	0.0	3.4
1983-84	0.0	0.0	0.0	0.0	0.0	T	T	5.2	T	0.0	0.0	0.0	5.2
1984-85	0.0	0.0	0.0	0.0	0.0	T	4.3	0.0	T	0.0	0.0	0.0	4.3
1985-86	0.0	0.0	0.0	0.0	0.0	T	3.6	1.1	T	0.0	0.0	0.0	4.7
1986-87	0.0	0.0	0.0	0.0	0.0	T	1.6	1.0	1.2	T	0.0	0.0	3.8
1987-88	0.0	0.0	0.0	0.0	0.3	T	4.4	T	T	0.0	0.0	0.0	4.7
1988-89	0.0	0.0	0.0	0.0	0.0	T	T	24.4	T	0.5	0.0	0.0	24.9
1989-90	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	T	0.0	0.0	T	0.5
1990-91	0.0	0.0	0.0	0.0	0.0	T	0.0	T	T	0.0	0.0	0.0	T
1991-92	0.0	T	0.0	0.0	0.0	T	T	0.0	T	T	0.0	0.0	T
1992-93	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Record	0.0	T	0.0	0.0	T	0.9	2.7	2.9	1.0	T	0.0	T	7.5
Mean	0.0	T	0.0	0.0	T	0.9	2.7	2.9	1.0	T	0.0	T	7.5

See Reference Notes on Page 6B
Page 6A

REFERENCE NOTES

NORFOLK, VIRGINIA

GENERAL

T - TRACE AMOUNT.
BLANK ENTRIES DENOTE MISSING UNREPORTED DATA.
INDICATES A STATION OR INSTRUMENT RELOCATION.
SEE STATION LOCATION TABLE ON PAGE 8.

SPECIFIC

PAGE 2
PM - INCLUDES LAST DAY OF PREVIOUS MONTH.
ASOS - AUTOMATED SURFACE OBSERVING SYSTEM IN OPERATION DURING THESE MONTHS.

PAGE 3

1.1 - LENGTH OF RECORD IN YEARS, ALTHOUGH INDIVIDUAL MONTHS MAY BE MISSING.
0.1 CR - THE VALUE IS BETWEEN 0.0 AND 0.05.
NORMALS - BASED ON THE 1951-1980 RECORD PERIOD.
EXTREMES - DATES ARE THE MOST RECENT OCCURRENCE.
WIND DIR - NUMERALS SHOW DIRECTION OF DEGREE CLOCKWISE FROM TRUE NORTH. "00" INDICATES CALM.
RESULTANT DIRECTIONS ARE GIVEN TO WHOLE DEGREES.
BOLD VALUES INDICATE EXTREME VALUES WHICH OCCURRED AFTER THE ASOS SYSTEM WAS COMMISSIONED.

PAGE 4B

RECORD - PERIOD OF RECORD.
RECORD MEAN PRECIPITATION IS THE MEAN OF ALL DAILY PRECIPITATION AMOUNTS DURING THE PERIOD OF RECORD.
RECORD MAXIMUM TEMPERATURE IS THE MEAN OF ALL DAILY MAXIMUM TEMPERATURES DURING THE PERIOD OF RECORD.
RECORD MEAN TEMPERATURE IS THE SUM OF THE RECORD MAX AND RECORD MIN DIVIDED BY 2.
AVERAGE TEMPERATURE IS THE MEAN OF THE MEAN DAILY MAX AND MIN TEMPERATURE DIVIDED BY 2.

EXCEPTIONS

PAGE 3
1. PERCENT OF POSSIBLE SUNSHINE IS THROUGH 1980.
PAGES 4A, 4B, 6A
RECORD MEANS ARE THROUGH THE CURRENT YEAR, BEGINNING IN 1951 FOR TEMPERATURE
1951 FOR PRECIPITATION
1951 FOR SNOWFALL

NORFOLK, VIRGINIA

The city of Norfolk, Virginia, is located near the coast and the southern border of the state. It is almost surrounded by water, with the Chesapeake Bay immediately to the north, Hampton Roads to the west, and the Atlantic Ocean only 18 miles to the east. It is traversed by numerous rivers and waterways and its average elevation above sea level is 13 feet. There are no nearby hilly areas and the land is low and level throughout the city. The climate is generally marine. The geographic location of the city with respect to the principal storm tracks, is especially favorable, being south of the average path of storms originating in the higher latitudes and north of the usual tracks of hurricanes and other tropical storms.

The winters are usually mild, while the autumn and spring seasons usually are delightful. Summers, though warm and long, frequently are tempered by cool periods, often associated with northeasterly winds off the Atlantic. Temperatures of 100 degrees or higher occur infrequently. Extreme cold waves seldom penetrate the area and temperatures of zero or below are almost nonexistent. Winters pass, on occasion, without a measurable amount of snowfall. Most of the snowfall in Norfolk is light and generally melts within 24 hours.

Based on the 1951-1980 period, the average first occurrence of 32 degrees Fahrenheit in the fall is November 17 and the average last occurrence in the spring is March 23.

STATION LOCATION

NORFOLK, VIRGINIA

LOCATION	OCCUPIED FROM	OCCUPIED TO	AIRLINE DISTANCES AND DIRECTIONS FROM PREVIOUS LOCATION	LATITUDE NORTH	LONGITUDE WEST	ELEVATION ABOVE										* TYPE	REMARKS
						SEA LEVEL	GROUND										
							GROUND TEMPERATURE	WIND INSTRUMENTS	EXTREME THERMOMETERS	PSYCHROMETER	SUNSHINE SWITCH	TIPPING BUCKET	RAIN GAGE	WINDING RAIN GAGE	8 INCH RAIN GAGE		
CITY - - NOTE: For period January 1, 1871 through January 31, 1888, refer to previous editions.																	
Dodson Building (5th Floor) 53-55 Main Street	2/01/88	1/23/90	500 ft. W	36° 51'	76° 18'	10	85	82	82					80			
Dodson Building (2nd Floor) 53-55 Main Street	1/24/90	5/18/92	Same Bldg.	36° 51'	76° 18'	10	93	82	82					80			
Dodson Building (2nd Floor) 53-55 Main Street	5/19/92	12/31/98	Same Bldg.	36° 51'	76° 18'	10	93	82	82		80			80		Tipping bucket gage installed about 1897.	
Citizens Bank Building 191-195 Main Street	1/01/99	12/31/12	200 ft. E	36° 51'	76° 18'	10	111	98	98		96			96			
Royster Building 201-203 Granby Street	1/01/13	2/22/17	500 ft. W	36° 51'	76° 18'	9	205	170	170		163			163			
Royster Building 201-203 Granby Street	2/23/17	11/30/34	Same Bldg.	36° 51'	76° 18'	9	205	170	170		178			178		One story added to part of building. Rain gages relocated.	
U.S. Post Office and Fed. Court Building 600 Granby Street	12/01/34	7/31/53	1000 ft. W	36° 51'	76° 17'	11	125	80	80		73			73		USO Norfolk was combined with USAS at the Norfolk Municipal Airport on 8/1/53.	
COOPERATIVE Virginia Electric Gas Plant, Starr and Monticello Streets	8/01/53	1965	0.3 mi. W	36° 52'	76° 17'	11		5						3			
AIRPORT Norfolk Municipal AP 5.4 Airline Miles ENE of Post Office	7/08/38	5/01/40	NA	36° 53'	76° 12'	25	25		5								
Norfolk Municipal AP	5/01/40	3/05/52	900 ft. WNW	36° 53'	76° 12'	25	55	6	6					3			
Norfolk Municipal AP	3/05/52	Present	0.25 mi. W	36° 54'	76° 12'	c24	33 1/2 150 76.5	6	6	264	3	NA	3	NA	NA	a - Telepsychrometer (4") 3/5/52 to 8/31/59. Hydro com. 470' SE of office 8/31/59. b - Direct reading sensor on field. c - Autographic record sensor. 26 ft. to 8/31/59 and 22 ft. to 12/8/59. d - Data source to 8/31/59. e - Relocated 8/24/75. f - Moved 1210 ft. Se on 5/18/78. g - Commissioned 8/2/53. h - Type change 1/22/80. i - Moved 80 ft. W 3/5/82.	
* Norfolk Regional Airport effective 11/1/68. International Airport in Nov. 1978.																	
DESCRIPTION:																	

* Norfolk Regional Airport effective 11/1/68.
International Airport in Nov. 1976.

SUBSCRIPTION:

Price and ordering information available through: National Climatic Data Center, Federal Building, Asheville, North Carolina 28801.
INQUIRIES/COMMENTS CALL: (704) 271-4800 USCOM-NOAA-ASHEVILLE, N.C. - 655

National Climatic Data Center
Federal Building
37 Battery Park Avenue
Asheville NC 28801-2733

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CHAIN OF CUSTODY

Original chain of Custody goes to Laboratory

Proj. #		Project name		Type of container	Number of containers	VOC	Total Lead	Dissolved Lead	Calcium Magnesium	Bicarbonate	Remarks
Samplers (Please print)											
NAB - Little Creek											
Michael Schmidt / Anne Garibaldi											
Date	Time	Comp.	Grab	Sample Identification							
5/14/93			✓	056W-101	40ml	2	✓				HCl
	1153		✓	056W-101	500ml	1	✓				HNO ₃
	1153		✓	056W-101	500ml	1		✓			HNO ₃
	1153		✓	056W-101	12g	1		✓			
	1208		✓	056W-102	40ml	2	✓				HCl
	1208		✓	056W-102	500ml	1	✓				HNO ₃
	1208		✓	056W-102	500ml	1		✓			HNO ₃
	1208		✓	056W-102	12g	1		✓			
	1232		✓	056W-103	40ml	2	✓				HCl
	1232		✓	056W-103	500ml	1	✓				HNO ₃
	1232		✓	056W-103	500ml	1		✓			HNO ₃
	1232		✓	056W-103	12g	1		✓			
	1248		✓	056W-104	40ml	2	✓				HCl
✓	1248		✓	056W-104	500ml	1	✓				HNO ₃
Relinquished by (Signature)		Date/Time		Received by (Signature)		Date/Time		Remarks: 1 of 3			
Michael Schmidt		5/14/93									
Relinquished by (Signature)		Date/Time		Received by (Signature)		Date/Time					
Relinquished by (Signature)		Date/Time		Received by (Signature)		Date/Time					

CHAIN OF CUSTODY

Original chain of Custody goes to Laboratory

Proj. #		Project name			Type of container	Number of containers	<div style="display: flex; justify-content: space-between;"> <div> VOC Total Lead Dissolved Lead Calcium Magnesium Bicarbonate </div> <div> (Filtered) </div> </div>										Remarks
Samplers (Please print)																	
Date	Time	Comp.	Grab	Sample Identification													
11/14/18	1248		/	OS-GW-104	1	500ml		✓								HNO ₃	
	1248		/	OSGW-104	1	1Lg			✓								
	1246		/	OS-GW-104-MS/MSD	2	40ml	✓									HCl	
	1248		/	OSGW-104-MS/MSD	1	500ml	✓									HNO ₃	
	1248		✓	OSGW-104-MS/MSD	1	500ml		✓								HNO ₃	
	1248		✓	OSGW-104-MS/MSD	1	1Lg			✓								
	1300		✓	OSGW-105	2	40ml	✓									HCl	
	1300		/	OSGW-105	1	500ml	✓									HNO ₃	
	1300		/	OSGW-105	1	500ml		✓								HNO ₃	
	1300		✓	OSGW-105	1	1Lg			✓								
	1330		/	OSGW-ER	2	40ml	✓									HCl	
	1330		/	OSGW-ER	1	500ml	✓									HNO ₃	
	1330		/	OSGW-ER	1	500ml		✓								HNO ₃	
✓	1330		/	OSGW-ER	1	1Lg			✓								

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks: 2 of 3
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

Henry J. Bickel

Henry J. Bickel

Original chain of Custody goes to Laboratory

[illegible]



HEARTLAND ENVIRONMENTAL SERVICES, INC.

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Data Validation Report

PCBs Only & TOCs

June 30, 1993

Revised October 26, 1993


Prepared for
BAKER ENVIRONMENTAL, INC.
420 Rouser Road
Coraopolis, PA 15108

This Data Validation Report is a review of the analytical results of sampling conducted May 13, 1993 in support of the Baker Navy CLEAN Program, CTO-19042, NAB Little Creek, Virginia Beach, VA. There were two (2) water samples and eleven (11) soil samples which were received and analyzed by CEIMIC, Corp. in this analytical batch, Case# 19042, SDG# 16-SS-109 (PCBs) and SDG# 930304 (TOCs).

Heartland ESI personnel have reviewed the data presented for the Samples listed below for the Analytical Fractions indicated. The CLP fraction has been validated utilizing: the "Laboratory Data Validation Functional Guidelines For Evaluating Organics Analysis, June, 1991; specific method requirements of OLM01.8 and SW846 Method 8081, November 1990; NEESA Level D requirements and good professional judgement. The TOC fraction was validated using method specific and NEESA Level E requirements.

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatogram, etc., for each sample have been carefully reviewed. The end-user is urged to review the **Specific Findings** and associated **Data Qualifications** presented in this report. Annotated Form Is for all samples reviewed are included after the **Narratives**. Form Is for MS/MSD samples are not necessarily annotated.

The release of this Data Validation Report is authorized by the following signature:


Christopher D. Scarpellino, Project Manager

10/26/93
Date

DATA ASSESSMENT NARRATIVE

PCB ONLY ANALYSIS

General

The organic findings offered in this screening report assume that all analytical results are correct as reported and are based upon the examination of the reported holding times, GC instrument performance, initial and continuing calibrations, analytical sequence, blank analysis results, surrogate recoveries, and MS/MSD results. All comments made within this report should be considered when examining the analytical results (Form Is). Please refer the specific findings found in each category to the Summary of Data Qualification table.

This data package contained the laboratory results of the analysis of three (3) soil samples, Laboratory Case # 19042, SDG # 16SS10. The validator has reviewed the data for these samples for the Target PCBs using the requirements contained in: the EPA CLP OLM01.8 Statement of Work, dated August 1991 and the requirements of SW-846 Method 8081, November 1990; and the Draft EPA Pesticide/Aroclor Data Review Guidelines, 06/91. Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to the requirements and deliverables of U.S. EPA CLP, SW-846 Method 8081, and NEESA Level D deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. In general, the laboratory performance and data package presented were acceptable. The target analyte list included PCBs only for this SDG.

Contractual Non-Compliance

It is the reviewer's interpretation of the NEESA protocol that the laboratory is required to analyze blank spike samples with each extraction batch and plot these results to obtain statistically determined control limits with which to analyze the performance of the method. Initially there were no QC charts present and no evidence that Laboratory Control Standards were extracted or analyzed with the SDG. Subsequently, on 9/8/93, the laboratory supplied the raw data and recoveries for the apparently associated Laboratory Control Samples. The recoveries of the single component pesticides spiked were acceptable.

In addition, the laboratory stated that the PCB only samples were analyzed utilizing SW-846 clean-up procedures and a modified analytical procedure which utilized a CLP-type initial calibration, one-point, for the target PCBs. The laboratory appropriately utilized sulfuric acid cleanup, SW-846 Method 3665, for these PCB only samples. The other recommended clean-up steps, silica gel fractionation (Method 3630) or Florisil cartridge cleanup (Method 3620) were not utilized. The lack of the additional cleanup steps did not appear to adversely impact the chromatography or reported sample results.

Holding Times

All holding times were apparently met. Extraction and analysis dates were obtained from the Form 1s, Form 4s, and Form 8s because extraction records were not included in the data package.

GC Instrument Performance

The resolution requirements were met on both columns utilized for these analyses.

All surrogate retention times were within the established RTWs with the exception of those in which the surrogates were diluted out. The percent breakdowns for 4,4'-DDT and Endrin were within the required QC limits for the both columns. No qualifications were required.

Initial Calibration

All compounds in the initial calibration on C1 (DB-608) and on C2 (DB-1701) exhibited %RSDs which were within QC limits. Some RTW (retention time window) overlap was noted in the peak selection for Aroclor identification and quantitation. On C1, the RTWs for Endosulfan I and α -chlordane overlapped, and on C2, the RTWs for Endosulfan II and 4,4'-DDD overlapped. See the Analyte Identification/Quantitation section for further discussion.

Continuing Calibrations

All compounds in the calibration standards were within the laboratory reported Retention Time Windows (RTWs) for both columns.

All continuing calibration standards exhibited relative percent differences, RPDs, within the QC limits. No qualifications were required.

Blanks

No peaks were confirmed within the RTWs of target compounds in the method blank associated with these samples.

The instrument blanks were acceptable, containing only very minor peaks.

PCB Only Data Assessment Narrative - Page 3

Blanks, continued.

The sulfur cleanup blank was not required because sulfur cleanup was not performed on any of the samples. No qualification of the data was required.

Florisil/GPC Checks

The laboratory appropriately utilized sulfuric acid cleanup, SW-846 Method 3665, for these PCB only samples. The other recommended clean-up steps, silica gel fractionation (Method 3630) or Florisil cartridge cleanup (Method 3620) were not utilized. The lack of the additional cleanup steps did not appear to adversely impact the chromatography or reported sample results.

Surrogate Recoveries

Several samples exhibited surrogate recoveries outside the QC criteria. Most of the non-compliant recoveries were the low recovery of the compound DCB. TCX was recovered acceptably in all samples with the exception of the dilution run of sample 16SS109 in which the surrogates were diluted out. No qualifications were required due to surrogate recoveries.

Matrix Spike/Matrix Spike Duplicate

There was no MS/MSD performed with this SDG.

Analyte Identification/Quantitation

One positive result for AR1248 was reported by the laboratory in these samples. Identification and quantitation appears reasonable based on review of the chromatograms and calculation verification. It was noted that the laboratory chose peaks which overlapped considerably for many of the aroclors. Due to overlapping peak retention time windows, the number of potential peaks available for quantitation of the target compounds was limited. Unique peak selection for each aroclor is important. Based on review of the standards chromatography it would have been possible to select unique peaks for most of the aroclors. It is often difficult to choose adequate peaks for aroclor quantitation. However, the laboratory should make an increased effort to choose unique peaks for each aroclor.

Analyte Identification/Quantitation, continued.

One qualification was required based on the differences observed between column quantitation.

Specific Finding

1. The reported positive result for the analyte is qualified as quantitatively estimated, "J", due to differences in the column quantitations.

Overall Assessment

The overall quality of the data package is good. The reported results are accepted as reported by the laboratory with the noted qualification.

QUALIFICATION CODES

U	=	Not detected
J	=	Reported result is quantitatively estimated
UJ	=	Reported quantitation limit is qualified as estimated
R	=	Result is rejected and unusable
N	=	Result is negated, do not consider result in sample
NJ	=	Presumptive evidence for the presence of the material at an estimated concentration

Validation specific findings are noted in numerical form on the Form Is in this data validation report. These specific finding footnotes reflect the conclusions found in the data validation process that resulted in the qualifications of the data.

SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>ANALYTE</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDING</u>
All soil samples	Al, Ca, Cu, Fe, Mg, Mn, Hg, Na and Zn.	+	U	1
All soil samples	Sb and Ag.	+ /U	J/UJ	2
All soil samples	Cu.	+	J	3
All soil samples	Fe, Pb and Mn.	+ /U	J/UJ	4
298-03, -04, -05, -06, -08, -09, -10, -11, -13, -16, -19 and -20.	Se	+ /U	J/UJ	5
298-04, -12, -14, -16, -17, -18 and -19.	Tl			

DL - denotes laboratory qualifier/reported value

+ denotes positive values

U denotes non-detect values

QL - denotes data validation qualifier

SUMMARY OF PCB ONLY DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
ALL	ALL P	+	J	1

- * DL denotes the Form I laboratory qualifier/value
 - + in the DL column denotes a positive result
- QL denotes the qualifier(s) used by Validator
 - + in the QL column denotes a validator revised result



HEARTLAND ENVIRONMENTAL SERVICES, INC.

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DATA VALIDATION

REPORT

COPY

Client Name: Baker Environmental, Inc.

Site Name: NAB Little Creek, Virginia Beach, VA

Case Number: 19042

SDG Number(s): 07-SS-101, 05-GW-ER,
16-SS-109 and 930298

QA/QC Level: NEESA Level D, C & E

Fractions: Volatiles, Semivolatiles,
Pesticide/Aroclors,
TAL Metals w/CN , TPHC,
TOC, Lead and Alkalinity

Volume No: 3 of 3



HEARTLAND ENVIRONMENTAL SERVICES, INC.

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(314) 278-8232 • (314)278-1828 • FAX: (314)278-2709

Data Validation Report

CLP ORGANICS & INORGANICS

June 30, 1993

Prepared for

BAKER ENVIRONMENTAL, INC.
420 Rouser Road
Coraopolis, PA 15108

This Data Validation Report is a review of the analytical results of sampling conducted May 13, 1993 in support of the Baker Navy CLEAN Program, CTO-19042, NAB Little Creek, Virginia Beach, VA. There were eighteen (18) soil samples with one (1) MS/MSD which were received and analyzed by CEIMIC, Corp. in this analytical batch, Case# 19042, SDG# 07-SS-101 and SDG 930298 (TPHC & TOC).

Heartland ESI personnel have reviewed the data presented for the Samples listed below for the Analytical Fractions indicated. The CLP fractions have been validated utilizing: the "Laboratory Data Validation Functional Guidelines For Evaluating Organics Analysis, June, 1991; the "Laboratory Data Validation Functional Guideline for Evaluating Inorganic Analysis, July 1, 1988; specific method requirements of OLM01.8 and ILM03.0; NEESA Level D requirements and good professional judgement.

Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to these requirements and deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. A minimum of 10% of all laboratory calculations have been verified as part of this validation. All instrument output, i.e. spectra, chromatogram, etc., for each sample have been carefully reviewed. The end-user is urged to review the Specific Findings and associated Data Qualifications presented in this report. Annotated Form Is for all samples reviewed are included after the Narratives. Form Is for MS/MSD samples are not necessarily annotated.

The release of this Data Validation Report is authorized by the following signature:


Christopher D. Scarpellino, Project Manager

6/30/93
Date

000111



Case# 19042 SDG 07-SS-101

SAMPLES AND FRACTIONS REVIEWED

<u>Sample Identifications</u>			<u>Analytical Fractions</u>				
<u>BAKER ID</u>	<u>CEIMIC ID</u>	<u>Matrix</u>	<u>VOA</u>	<u>SV</u>	<u>PAR</u>	<u>TAL</u>	<u>CN</u>
07-SS-101	930298-01	SOIL	X	X	X	X	X
07-SS-102	930298-02	SOIL	X	X	X	X	X
07-SS-103	930298-03	SOIL	X	X	X	X	X
07-SS-104	930298-04	SOIL	X	X	X	X	X
07-SS-104MS	930298-04MS	SOIL	X	X	X	X	X
07-SS-104MSD	930298-04MSD	SOIL	X	X	X	X	X
07-SS-105	930298-05	SOIL	X	X	X	X	X
07-SS-106	930298-06	SOIL	X	X	X	X	X
07-SS-107	930298-07	SOIL	X	X	X	X	X
07-SS-108	930298-08	SOIL	X	X	X	X	X
07-SS-109	930298-09	SOIL	X	X	X	X	X
09-SS-101	930298-10	SOIL				X	X
09-SS-102	930298-11	SOIL				X	X
09-SS-103	930298-12	SOIL				X	X
09-SS-104	930298-13	SOIL				X	X
09-SS-105	930298-14	SOIL				X	X
09-SS-106	930298-15	SOIL				X	X
09-SS-107	930298-16	SOIL				X	X
10-SS-101	930298-17	SOIL				X	X
10-SS-102	930298-18	SOIL				X	X
10-SS-103	930298-19	SOIL				X	X
10-SS-104	930298-20	SOIL				X	X

Total Number of Samples (Water/Soil) 0/11 0/11 0/11 0/22 0/22

MS - Matrix Spike

MSD - Matrix Spike Duplicate or Duplicate

Individual fractions were reviewed as follows:

	<u>Primary</u>	<u>Secondary</u>
VOA - Volatiles (CLP, OLM01.8)	Gene Watson	Dan Heil
SV - Semivolatiles (CLP, OLM01.8)	Dan Heil	Gene Watson
PAR - Pesticide/Aroclors (CLP, OLM01.8)	Jackie Cleveland	Chris Scarpellino
TAL - TAL Metals (CLP, ILM03.0)	Paul Humburg	Chris Scarpellino
CN - Cyanide (CLP, ILM03.0)	Paul Humburg	Chris Scarpellino

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DATA ASSESSMENT NARRATIVES

DATA ASSESSMENT AND NARRATIVE

VOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA CLP, 3/90 SOW; the National Functional Guidelines for Organic Data Review, and NEESA Level D. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG 07-SS-101

Holding Times

The holding times for all of the samples were met per the Organic Functional Guidelines (fourteen (14) days from collection date) and the CLP SOW.

Tuning

All of the BFB tunes in the initial and continuing calibrations met the percent relative abundance criteria of the SOW and the Organic Functional Guidelines. No qualifications are required.

Initial Calibrations

One (1) of the two (2) initial calibrations that were analyzed by the laboratory for these samples were not acceptable for all compound %RSDs. The average RRFs for all of the compounds met the initial calibration criteria.

Specific Finding:

1. The initial calibration analyzed on 02/15/93 contained compounds with %RSD greater than 30% RSD. However, qualifications are not required since samples were not analyzed following the initial calibration.

chloroethane

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DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

PAGE - 2

Continuing calibrations

Three (3) of the four (4) continuing calibrations that were analyzed with this data package exhibited %Ds that were not within %D continuing calibration criteria. All RRFs for the heated calibrations were within calibration criteria.

Specific Finding:

2. For the samples listed below, the continuing calibration, E8679, contained compounds with %Ds greater than 25%, but less than 50%. For the compound listed below, qualify all positive results as estimated (J).

VBLKEM	vinyl chloride *
07-SS-103	carbon disulfide
07-SS-104MSD	chloroethane
07-SS-106	

* denotes calibration criteria compound

3. For the samples listed below, the continuing calibration, E8679, contained compounds with %Ds greater than 50%, but less than 90%. For the compound listed below, qualify all positive results as estimated (J) and all non detect results as estimated (UJ).

VBLKEM	chloromethane
07-SS-103	
07-SS-104MSD	
07-SS-106	

4. For the samples listed below, the continuing calibration, E8695, contained compounds with %Ds greater than 25%, but less than 50%. For the compound listed below, qualify all positive results as estimated (J).

VBLKEN	2-hexanone
07-SS-101	methylene chloride
07-SS-102	carbon disulfide
07-SS-104MS	
07-SS-107	
07-SS-108	

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DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

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Continuing Calibrations (continued)

5. For the samples listed below, the continuing calibration, E8695, contained compounds with %Ds greater than 50%, but less than 90%. For the compound listed below, qualify all positive results as estimated (J) and all non detect results as estimated (UJ).

VBLKEN	chloromethane
07-SS-101	
07-SS-102	
07-SS-104MS	
07-SS-107	
07-SS-108	

6. For the samples listed below, the continuing calibration, G4450, contained compounds with %Ds greater than 25%, but less than 50%. For the compound listed below, qualify all positive results as estimated (J).

VBLKGS	bromomethane *
07-SS-109	2-butanone

* denotes calibration criteria compound

Internal Standards

All of the internal standards met the EICP internal standard area criteria. No qualifications are required.

Method Blanks

Three (3) of the four (4) method blanks that were analyzed exhibited contamination for methylene chloride and/or acetone. The method blank results will be compared to their associated samples. Refer to the glossary of data qualifiers for a list and definition of the method blank qualifiers: CRQL, U and No Action.

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DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

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Method Blanks (continued)

Specific findings:

7. The following samples have been qualified for blank contamination. The qualifications are for all the blanks.

methylene chloride - CRQL

07-SS-106

07-SS-104

07-SS-105

methylene chloride - U

07-SS-103

acetone - CRQL

07-SS-103

acetone - U

07-SS-106

07-SS-101

07-SS-102

07-SS-107

Trip Blanks

A trip blank was not identified in this SDG.

Rinseate Blanks

A rinseate blank was not identified in this SDG.

Field Blanks

A field blank was not identified in this SDG.

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DATA ASSESSMENT AND NARRATIVE

VOLATILE ANALYSIS

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Surrogates

All of the surrogate recoveries for the soil samples were within QA/QC limits. No qualifications are required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

The MS/MSD that was analyzed exhibited all RPDs greater than the advisory limits. All percent recoveries were acceptable. No qualifications are required.

Compound Identification/Quantitation

No qualifications are required.

System Performance and Overall Assessment

The overall system performance was fair. The laboratory did not encounter any large problems. The data reviewer estimates that less than 5% of the data is qualified.

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GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

NJ = Presumptive evidence for the presence of the material at an estimated value

K = Result is biased high

L = Result is biased low

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that analyte is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the analyte value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
VBLKEM 07-SS-103 07-SS-104MSD 07-SS-106	vinyl chloride carbon disulfide chloroethane	+	J	2
VBLKEM 07-SS-103 07-SS-104MSD 07-SS-106	chloromethane	+/-	J/UJ	3
VBLKEN 07-SS-101 07-SS-102 07-SS-104MS 07-SS-107 07-SS-108	2-hexanone methylene chloride carbon disulfide	+	J	4
VBLKEN 07-SS-101 07-SS-102 07-SS-104MS 07-SS-107 07-SS-108	chloromethane	+/-	J/UJ	5
VBLKGS 07-SS-109	bromomethane 2-butanone	+	J	6

- * DL denotes the Form I qualifier supplied by the laboratory
 QL denotes the qualifier used by the data validation firm
 + in the DL column denotes a positive result
 - in the DL column denotes a non detect result

SUMMARY OF DATA QUALIFICATIONS

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<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
07-SS-106 07-SS-104 07-SS-105	methylene chloride	+BJ	CRQL	7
07-SS-103	methylene chloride	+B	U	7
07-SS-103	acetone	+BJ	CRQL	7
07-SS-106 07-SS-101 07-SS-102 07-SS-107	acetone	+B	U	7

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- + in the DL column denotes a positive result
- in the DL column denotes a non detect result

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DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ORGANICS

General

The organic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, blank analysis results, surrogate and matrix spike recoveries, GC/MS performance, tuning results, calibration results and internal standard areas. This report was prepared in compliance relative to the analytical and deliverable requirements specified in the U.S. EPA CLP, 3/90 SOW; the National Functional Guidelines for Organic Data Review, and NEESA Level D. All comments made within this report should be considered when examining the analytical results (Form I's).

SDG # 07-SS-101

Holding Times

All extraction and analysis holding times for all samples were met for all samples per the SOW and National Functional Guidelines. Qualifications are not required.

Tuning

All of the DFTPP tunes in the initial and continuing calibrations met the percent relative abundance criteria of the SOW and the Organic Functional Guidelines. No qualifications are required.

Initial Calibrations

The initial calibrations that was analyzed by the laboratory for these samples was acceptable for all compound %RSDs. The average RRFs for all of the criteria compounds met the initial calibration criteria. No qualifications are required.

Continuing Calibrations

The continuing calibrations that were analyzed all of the criteria and non criteria compounds met requirements for RRFs. Qualifications are required for compounds with non compliant %Ds.

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ANALYSIS

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Continuing Calibrations

Specific Findings:

1. The continuing calibration, J5332, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples listed below, qualify all positive results, for the non compliant compounds also listed below, as estimated (J).

SBLKJG	bis(2-chloroethyl)ether *
	fluoranthene *
	4-chloroaniline
	4-nitrophenol
	di-n-octylphthalate
	2,4,6-tribromophenol
	* - denotes a calibration criteria compound

2. The continuing calibration, J5332, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples listed below, qualify all positive results, for the non compliant compounds also listed below, as estimated (J) and qualify all non detects as estimated (UJ).

SBLKJG	2,2'-oxybis(1-chloropropane)
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3. The continuing calibration, J5370, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples listed below, qualify all positive results, for the non compliant compounds also listed below, as estimated (J).

07-SS-101	2,4-dinitrotoluene *
07-SS-102	pentachlorophenol *
07-SS-103	benzo(k)fluoranthene *
07-SS-104	benzo(g,h,i)perylene *
07-SS-104MS	2,2'-oxybis(1-chloropropane)
07-SS-104MSD	2,4-dinitrophenol
07-SS-105	4-nitroaniline
07-SS-106	4,6-dinitro-2-methylphenol
07-SS-107	* - denotes a calibration criteria compound
07-SS-109	

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ANALYSIS

PAGE - 3

Continuing Calibrations (continued)

Specific Findings:

4. The continuing calibration, J5370, contained compounds with %Ds greater than 50% D but less than 90% D. For the samples listed below, qualify all positive results, for the non compliant compounds also listed below, as estimated (J) and qualify all non detects as estimated (UJ).

07-SS-101	4-chloroaniline
07-SS-102	
07-SS-103	
07-SS-104	
07-SS-104MS	
07-SS-104MSD	
07-SS-105	
07-SS-106	
07-SS-107	
07-SS-109	

5. The continuing calibration, J5390, contained compounds with %Ds greater than 25% D but less than 50% D. For the samples listed below, qualify all positive results, for the non compliant compounds also listed below, as estimated (J).

07-SS-103RE	pentachlorophenol *
07-SS-105RE	fluoranthene *
07-SS-106RE	hexachlorobutadiene
07-SS-108	di-n-octylphthalate
07-SS-107RE	* - denotes a calibration criteria compound

6. The continuing calibration, J5350, has the compound benzo(g,h,i)perylene with an RRF less than the required minimum. No qualifications is required because, the RRF is greater than 0.05.

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ANALYSIS

PAGE - 4

Internal Standards

All of the blank and sample internal standard EICP areas did not meet the EICP internal standard area QA/QC criteria.

Specific Finding:

7. For the samples listed below, one (1) or more internal standards exhibited EICP areas less than -50% of the associated internal standard area from the twelve (12) hour calibration standard. Qualify all positive results associated with the non compliant internal standard area as estimated (J) and qualify all non detects as estimated (UJ).

07-SS-103	chrysene-d ₁₂
07-SS-103RE	perylene-d ₁₂
07-SS-107RE	

07-SS-105RE	perylene-d ₁₂
07-SS-106RE	

8. For the samples listed below, one (1) or more internal standards exhibited EICP areas greater than +100% of the associated internal standard area from the twelve (12) hour calibration standard. Qualify all positive results associated with the non compliant internal standard area as estimated (J).

07-SS-105	1,4-dichlorobenzene-d ₄
07-SS-107	acenaphthene-d ₁₀
	phenanthrene-d ₁₀

07-SS-104MSD	acenaphthene-d ₁₀
	phenanthrene-d ₁₀

07-SS-104	phenanthrene-d ₁₀
07-SS-104MS	
07-SS-106	

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ANALYSIS

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Method Blanks

The method blanks that were analyzed exhibited contamination for TICs. The method blank results will be compared to their associated samples. Refer to the glossary of data qualifiers for a list and definition of the method blank qualifiers: CRQL, U and No Action.

Specific Findings:

9. The following samples have been qualified for TIC contamination. Qualifications are for all method blanks.

07-SS-101	1,2
07-SS-102	1,2,3
07-SS-103	1,3
07-SS-103RE	1,2,3
07-SS-104	1,2
07-SS-105	1,2
07-SS-105RE	1,2
07-SS-106	1,2
07-SS-106RE	1,2
07-SS-107	1,2
07-SS-107RE	1,2
07-SS-108	1,2
07-SS-109	1,2,3

Surrogates

Surrogate recoveries for all samples and blanks did not meet QA/QC criteria. Qualifications are not required. The SOW and Functional Guidelines allow one surrogate from each fraction to fall outside of the QA/QC criteria as long as the recoveries are greater than 10%.

DATA ASSESSMENT NARRATIVE

SEMIVOLATILE ANALYSIS

PAGE - 7

Surrogates (continued)

Specific Finding:

10. For the samples listed below, two (2) or more surrogates exhibited recoveries from the same fraction with recoveries less than the QA/QC limits. Qualify all positive results for that fraction as estimated (J) and qualify all non detects as estimated (UJ).

07-SS-103	base/neutral
07-SS-103RE	acid/base/neutral

Matrix Spike/Matrix Spike Duplicate

The MS/MSD that was analyzed for the semi-volatile samples all spike and RPD recoveries were not within the advisory limits. No qualification are required.

Compound Identification/Quantitation

Specific Finding:

11. For the re-analyzed samples listed below, reject all results in favor of the original sample results.

07-SS-105RE
07-SS-106RE
07-SS-107RE

12. For sample 07-SS-103RE, reject all results in favor of 07-SS-103 due to low surrogate recoveries.

System Performance and Overall Assessment

Overall performance was fair. The laboratory did not encounter any large problems. The data reviewer estimates less than 10% of data required qualification.

GLOSSARY OF DATA QUALIFIERS

QUALIFICATION CODES

U = Not detected

J = Estimated value

UJ = Reported quantitation limit is qualified as estimated

R = Result is rejected and unusable

NJ = Presumptive evidence for the presence of the material at an estimated value

K = Result is biased high

L = Result is biased low

METHOD BLANK QUALIFICATION CODES

CRQL = The sample result for the blank contaminant is less than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is rejected and the CRQL for that analyte is reported.

U = The sample result for the blank contaminant is greater than the sample CRQL and is less than 10X the method blank value. The sample result for the blank contaminant is qualified as non detected at the analyte value reported.

No Action = The sample result for the blank contaminant is greater than the sample CRQL and is greater than 10X the method blank value. The sample result for the blank contaminant is not qualified with any blank qualifiers.

The specific findings will be noted in numerical form on the Form Is in this data validation report. These specific finding footnotes will reflect the conclusions found in the data validation process that resulted in the qualification of the data.

SUMMARY OF DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
SBLKJG	bis(2-chloroethyl)ether * fluoranthene * 4-chloroaniline 4-nitrophenol di-n-octylphthalate 2,4,6-tribromophenol * - denotes a calibration criteria compound	+	J	1
SBLKJG	2,2'-oxybis (1-chloropropane)	+/-	J/UJ	2
07-SS-101	2,4-dinitrotoluene *	+	J	3
07-SS-102	pentachlorophenol *			
07-SS-103	benzo(k)fluoranthene *			
07-SS-104	benzo(g,h,i)perylene *			
07-SS-104MS	2,2'-oxybis(1-chloropropane)			
07-SS-104MSD	2,4-dinitrophenol			
07-SS-105	4-nitroaniline			
07-SS-106	4,6-dinitro-2-methylphenol			
07-SS-107	* - denotes a calibration criteria compound			
07-SS-109				
07-SS-101	4-chloroaniline	+/-	J/UJ	4
07-SS-102				
07-SS-103				
07-SS-104				
07-SS-104MS				
07-SS-104MSD				
07-SS-105				
07-SS-106				
07-SS-107				
07-SS-109				

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 - in the DL column denotes a non detect result

SUMMARY OF DATA QUALIFICATIONS

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<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>	
07-SS-103RE	pentachlorophenol *	+	J	5	
07-SS-105RE	fluoranthene *				
07-SS-106RE	hexachlorobutadiene				
07-SS-108	di-n-octylphthalate				
07-SS-107RE	* - denotes a calibration criteria compound				
<hr/>					
	All associated analytes	+/-	J/UJ	7	
07-SS-103	chrysene-d ₁₂				
07-SS-103RE	perylene-d ₁₂				
07-SS-107RE					
07-SS-105RE	perylene-d ₁₂				
07-SS-106RE					
<hr/>					
	All associated analytes	+	J	8	
07-SS-105	1,4-dichlorobenzene-d ₄				
07-SS-107	acenaphthene-d ₁₀				
	phenanthrene-d ₁₀				
07-SS-104MSD	acenaphthene-d ₁₀				
	phenanthrene-d ₁₀				
07-SS-104	phenanthrene-d ₁₀				
07-SS-104MS					
07-SS-106					

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SUMMARY OF DATA QUALIFICATIONS

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<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
	TICs	+	R	9
07-SS-101	1,2			
07-SS-102	1,2,3			
07-SS-103	1,3			
07-SS-103RE	1,2,3			
07-SS-104	1,2			
07-SS-105	1,2			
07-SS-105RE	1,2			
07-SS-106	1,2			
07-SS-106RE	1,2			
07-SS-107	1,2			
07-SS-107RE	1,2			
07-SS-108	1,2			
07-SS-109	1,2,3			
<hr/>				
07-SS-103	All analytes	+/-	J/UJ	10
07-SS-103RE	base/neutral			
	acid/base/neutral			
<hr/>				
07-SS-105RE	All analytes	+/-	R	11
07-SS-106RE				
07-SS-107RE				
<hr/>				
07-SS-103RE	All analytes	+/-	R	12

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 + in the DL column denotes a positive result
 - in the DL column denotes a non detect result

DATA ASSESSMENT NARRATIVE

PESTICIDE/AROCOLOR ANALYSIS

General

The organic findings offered in this screening report assume that all analytical results are correct as reported and are based upon the examination of the reported holding times, GC instrument performance, initial and continuing calibrations, analytical sequence, blank analysis results, surrogate recoveries, and MS/MSD results. All comments made within this report should be considered when examining the analytical results (Form Is). Please refer the specific findings found in each category to the Summary of Data Qualification table.

This data package contained the laboratory results of the analysis of eight (8) soil samples and four (4) water samples, Laboratory Case # 19042, SDG # 07SS10. The validator has reviewed the data for these samples for the TCL list for Pesticides/Aroclors using the requirements contained in: the EPA CLP OLM01.8 Statement of Work, dated August 1991; and the Draft EPA Pesticide/Aroclor Data Review Guidelines, 06/91. Analytical data in this report were screened to determine usability of results and also to determine contractual compliance relative to the requirements and deliverables of U.S. EPA CLP, and NEESA Level D deliverables. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. In general, the laboratory performance and data package presented were acceptable.

Contractual Non-Compliance

It is the reviewer's interpretation of the NEESA protocol that the laboratory is required to analyze blank spike samples with each extraction batch and plot these results to obtain statistically determined control limits with which to analyze the performance of the method. There were no QC charts present and no evidence that Laboratory Control Standards were extracted or analyzed with the SDG.

Holding Times

All holding times were apparently met. Extraction and analysis dates were obtained from the Form Is, Form 4s, and Form 8s because extraction records were not included in the data package.

GC Instrument Performance

The resolution requirements were met on both columns utilized for these soil analyses.

All surrogate retention times were within the established RTWs. The percent breakdowns for 4,4'-DDT and Endrin were within the required QC limits for the both columns. No qualifications were required.

Initial Calibration

Most compounds in the initial calibration on column 1 (DB-1701) and all compounds on column 2 (DB-608) were acceptably linear. All %RSDs were within QC limits for all compounds with the exception of Methoxychlor on C1. See specific findings for qualification. Some RTW overlap was noted in the peak selection for Aroclor identification and quantitation. The AR1260 was identified in one sample. See further discussion under Analyte Identification/Quantitation.

Specific Finding

1. All positive and non-detect values for the compound Methoxychlor in all samples are qualified as estimated, J or UJ, due to non-compliant %RSD (21.9%).

Continuing Calibrations

All compounds in the calibration standards were within the laboratory reported Retention Time Windows (RTWs) for both columns.

All continuing calibration standards exhibited relative percent differences, RPDs, within the QC limits. No qualifications were required.

Blanks

No peaks were confirmed within the RTWs of target compounds in the method blanks associated with these samples. The instrument blanks were acceptable, containing only very minor peaks.

The sulfur cleanup blank was not required because sulfur cleanup was not performed on any of the samples. No qualification of the data was required based on any of the associated Blanks.

Florisil/GPC Checks

The florisil cartridge check exhibited acceptable spike recoveries for all compounds. The raw data for the check standard was present in the package and acceptable.

The GPC calibration information and spike recoveries were acceptable.

Surrogate Recoveries

Several of the samples exhibited surrogate recoveries outside the QC criteria. One sample, 07SS103, required qualification due to overall low surrogate recoveries. Another sample 07SS107, required qualification due to overall high surrogate recoveries. The recoveries in this sample could be affected by the high level presence of AR1260.

Specific Finding

2. The positive and non-detect results in samples 07SS103 are qualified as estimated, J or UJ, due to overall low TCX and DCB recoveries (22% - 38%).
3. The positive results in sample 07SS107 are qualified as estimated, J, due to overall high TCX and DCB recoveries (162% - 206%).

Matrix Spike/Matrix Spike Duplicate

There was an MS/MSD performed on sample 07SS104. The recoveries of all spiked compounds were within QC limits with the exception of 4,4'-DDT, which was recovered slightly high in the MS. The aroclor 1260 was reported in the original sample, the MS and the MSD, at a high level. This could have caused the high 4,4'-DDT recovery due to an interfering aroclor peak. No qualifications were required based on the MS/MSD results.

Analyte Identification/Quantitation

Several positive results were reported by the laboratory in these samples. Identification and quantitation appears reasonable based on review of the chromatograms and calculation verification. AR1260 was reported in three samples. The multi-component compound was reported in sample 07SS106 at a value less than the CRQL. The extract was analyzed at a 1:5 dilution. The result exhibited acceptable column quantitation %Ds, and the pattern was relatively clear. Therefore,

Analyte Identification/Quantitation, continued.

the result was not qualified. It was noted that the laboratory chose peaks which overlapped considerably for many of the aroclors. According to the CLP Statement of Work, OLM01.3, page D-57, "A peak common to both analytes present in the sample must not be used to quantitate either compound." Further, due to overlapping peak retention time windows, the number of potential peaks available for quantitation of the target compounds was limited. Unique peak selection for each aroclor is important. Based on review of the standards chromatography it would have been possible to select unique peaks for most of the aroclors. It is often difficult to choose adequate peaks for aroclor quantitation. However, the laboratory should make an increased effort to choose unique peaks for each aroclor.

One qualification was required based on column quantitation differences. See specific findings for qualifications.

Specific Findings

4. The reported positive result for the analyte is qualified as quantitatively estimated, "J", due to differences in the column quantitations.

Overall Assessment

The overall quality of the data package is good. The reported results are accepted as reported by the laboratory with the noted qualifications.

QUALIFICATION CODES

U	=	Not detected
J	=	Reported result is quantitatively estimated
UJ	=	Reported quantitation limit is qualified as estimated
R	=	Result is rejected and unusable
N	=	Result is negated, do not consider result in sample
NJ	=	Presumptive evidence for the presence of the material at an estimated concentration

Validation specific findings are noted in numerical form on the Form Is in this data validation report. These specific finding footnotes reflect the conclusions found in the data validation process that resulted in the qualifications of the data.

SUMMARY OF PESTICIDE/AROCLOR DATA QUALIFICATIONS

<u>SAMPLE ID</u>	<u>ANALYTE ID</u>	<u>DL</u>	<u>QL</u>	<u>SPECIFIC FINDINGS</u>
ALL	METHOXYCHLOR	+ /U	J /UJ	1
07SS103	ALL	+ /U	J /UJ	2
07SS107	ALL	+	J	3
ALL	ALL P	+	J	4

- * DL denotes the Form I laboratory qualifier/value
 - + in the DL column denotes a positive result
- QL denotes the qualifier(s) used by Validator
 - + in the QL column denotes a validator revised result

DATA ASSESSMENT NARRATIVE

Metals

General

The inorganic findings offered in this screening report assumes that all analytical results are correct as reported and is based upon the examination of the reported holding times, calibration standards, blank analysis results and MS/MSD results. A minimum of ten percent of all laboratory calculations. All comments made within this report should be considered when examining the analytical results (Form Is).

This data package consisted of results from CT-042, SDG# 07SS101, the analysis of twenty (20) field soil samples and one Matrix Spike and Duplicate pair for TAL Metals and Cyanide. Overall, the inorganic data quality was fair. The All protocol requirements were followed with the exception of the following problems.

Specific QA/QC deficiency Findings are listed numerically in the following categories:

Non-compliant Issues

The Laboratory needs to update their IDLs for the new quarter as required by the USEPA SOW Protocol.

Holding Times

The holding times were met as specified in Section 3 of the NEESA (20.2-047B) QA protocol.

Calibration

No deficiencies in this section.

Preparation and Field Blanks

1. The preparation and field blanks exhibited contamination for the following elements.

Aluminum	4.57	mg/kg
Calcium	24.12	mg/kg
Copper	0.73	mg/kg
Iron	4.08	mg/kg
Magnesium	11.36	mg/kg
Manganese	0.39	mg/kg
Mercury	0.10	mg/kg
Sodium	26.43	mg/kg
Zinc	1.01	mg/kg

Metals Data Assessment Narrative (continued - Page 2)

The USEPA requires that all sample values below five times the preparation blank contamination be qualified as non-detect, "U".

Interferences

No significant interferences were observed.

Spike Recovery

2. The Matrix Spike recoveries for Antimony and Silver were below the lower control limit. All positive and non-detect results are qualified as estimated, "J" or "UJ".
3. The Matrix Spike recovery for Copper was above the upper control limit. All positive results are qualified as estimated, "J".

Duplicate

4. The Duplicate analyses for Iron, Lead and Manganese were outside the control limit. All positive and non-detect results are qualified as estimated, "J" or "UJ". The Duplicate for soils for Mercury was not greater than 35% and will not be qualified.

LCS

No deficiencies in this section.

Serial Dilution

No deficiencies in this section.

MSA

5. The following analytes exhibited low recovery during the GFAA spiking procedures. All data is qualified as estimated, "J" or "UJ".

<u>Analyte</u>	<u>Samples</u>
Selenium	298-03, -04, -05, -06, -08, -09, -10, -11, -13, -16, -19 and -20.
Thallium	298-04, -12, -14, -16, -17, -18 and -19.

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05-SS-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: RMW-5

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-08

Sample wt/vol: 5.00 (g/mL) 5

Lab File ID: H1679

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 16

Date Analyzed: 07/06/93

GC Column: DB-624 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.	COMPOUND			
74-87-3	Chloromethane	12	10	
74-83-9	Bromomethane	12	10	
75-01-4	Vinyl Chloride	12	10	
75-00-3	Chloroethane	12	10	
75-09-2	Methylene Chloride	12	10	
67-64-1	Acetone	20	10	9
75-15-0	Carbon Disulfide	12	10	
75-35-4	1,1-Dichloroethene	12	10	
75-34-3	1,1-Dichloroethane	12	10	
540-59-0	1,2-Dichloroethene (total)	12	10	
67-66-3	Chloroform	12	10	
107-06-2	1,2-Dichloroethane	12	10	
78-93-3	2-Butanone	12	10	
71-55-6	1,1,1-Trichloroethane	12	10	
56-23-5	Carbon Tetrachloride	12	10	
75-27-4	Bromodichloromethane	12	10	
78-87-5	1,2-Dichloropropane	12	10	
10061-01-5	cis-1,3-Dichloropropene	12	10	
79-01-6	Trichloroethene	12	10	
124-48-1	Dibromochloromethane	12	10	
79-00-5	1,1,2-Trichloroethane	12	10	
71-43-2	Benzene	12	10	
10061-02-6	trans-1,3-Dichloropropene	12	10	
75-25-2	Bromoform	12	10	
108-10-1	4-Methyl-2-Pentanone	12	10	
591-78-6	2-Hexanone	12	10	
127-18-4	Tetrachloroethene	12	10	
79-34-5	1,1,2,2-Tetrachloroethane	12	10	
108-88-3	Toluene	12	10	
108-90-7	Chlorobenzene	12	10	
100-41-4	Ethylbenzene	12	10	
100-42-5	Styrene	12	10	
1330-20-7	Xylene (total)	12	10	

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05-SS-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: BMW-8

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-08

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: H1679

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 16

Date Analyzed: 07/06/93

GC Column: DB-624 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Unknown	20.01	6	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05-SS-102

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: BMW-8

Matrix: (soil/water) SOIL

Lab Sample ID: 930419-09

Sample wt/vol: 5.00 (g/mL) 6

Lab File ID: H1663

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 4

Date Analyzed: 07/02/93

GC Column: DB624 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

74-87-3	Chloromethane	10	IU
74-83-9	Bromomethane	10	IU
75-01-4	Vinyl Chloride	10	IU
75-00-3	Chloroethane	10	IU
75-09-2	Methylene Chloride	10	IU
67-64-1	Acetone	10	IU
75-15-0	Carbon Disulfide	10	IU
75-35-4	1,1-Dichloroethene	10	IU
75-34-3	1,1-Dichloroethane	10	IU
540-59-0	1,2-Dichloroethene (total)	10	IU
67-66-3	Chloroform	10	IU
107-06-2	1,2-Dichloroethane	10	IU
78-93-3	2-Butanone	10	IU
71-55-6	1,1,1-Trichloroethane	10	IU
56-23-5	Carbon Tetrachloride	10	IU
75-27-4	Bromodichloromethane	10	IU
78-87-5	1,2-Dichloropropane	10	IU
10061-01-5	cis-1,3-Dichloropropene	10	IU
79-01-6	Trichloroethene	10	IU
124-48-1	Dibromochloromethane	10	IU
79-00-5	1,1,2-Trichloroethane	10	IU
71-43-2	Benzene	10	IU
10061-02-6	trans-1,3-Dichloropropene	10	IU
75-25-2	Bromoform	10	IU
108-10-1	4-Methyl-2-Pentanone	10	IU
591-78-6	2-Hexanone	10	IU
127-18-4	Tetrachloroethene	10	IU
79-34-5	1,1,2,2-Tetrachloroethane	10	IU
108-88-3	Toluene	10	IU
108-90-7	Chlorobenzene	10	IU
100-41-4	Ethylbenzene	10	IU
100-42-5	Styrene	10	IU
1330-20-7	Xylene (total)	10	IU

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1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05-SS-102

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: BMW-3

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-09

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: H1663

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 4

Date Analyzed: 07/02/93

GC Column: DB624 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====
_____	_____	_____	_____	_____

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05-SS-102RE

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: BMW-a

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-09RE

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: H1680

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 4

Date Analyzed: 07/06/93

GC Column: DB-624 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) <u>UG/KG</u>	G
---------	----------	--	---

74-87-3	Chloromethane	10	
74-83-9	Bromomethane	10	
75-01-4	Vinyl Chloride	10	
75-00-3	Chloroethane	10	
75-09-2	Methylene Chloride	10	
67-64-1	Acetone	15	
75-15-0	Carbon Disulfide	10	
75-35-4	1,1-Dichloroethene	10	
75-34-3	1,1-Dichloroethane	10	
540-59-0	1,2-Dichloroethene (total)	10	
67-66-3	Chloroform	10	
107-06-2	1,2-Dichloroethane	10	
78-93-3	2-Butanone	10	
71-55-6	1,1,1-Trichloroethane	10	
56-23-5	Carbon Tetrachloride	10	
75-27-4	Bromodichloromethane	10	
78-87-5	1,2-Dichloropropane	10	
10061-01-5	cis-1,3-Dichloropropene	10	
79-01-6	Trichloroethene	10	
124-46-1	Dibromochloromethane	10	
79-00-5	1,1,2-Trichloroethane	10	
71-43-2	Benzene	10	
10061-02-6	trans-1,3-Dichloropropene	10	
75-25-2	Bromoform	10	
108-10-1	4-Methyl-2-Pentanone	10	
591-78-6	2-Hexanone	10	
127-18-4	Tetrachloroethene	10	
79-34-5	1,1,2,2-Tetrachloroethane	10	
108-88-3	Toluene	10	
108-90-7	Chlorobenzene	10	
100-41-4	Ethylbenzene	10	
100-42-5	Styrene	10	
1330-20-7	Xylene (total)	10	

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05-SS-102RE

Lab Name: CEIMIC CORP Contract: BAKER
Lab Code: CEIMIC Case No.: 19042 SAS No.: _____ SDG No.: BMW-8
Matrix: (soil/water) SOIL Lab Sample ID: 930418-09RE
Sample wt/vol: 5.00 (g/mL) 6 Lab File ID: H1680
Level: (low/med) LOW Date Received: 07/02/93
% Moisture: not dec. 4 Date Analyzed: 07/06/93
GC Column: DB-634 ID: 0.530 (mm) Dilution Factor: 1.0
Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05-SS-103

Lab Name: CEIMIC CORP Contract: BAKER

Lab Code: CEIMIC Case No.: 19042 SAS No.: _____ SDG No.: BMW-8

Matrix: (soil/water) SOIL Lab Sample ID: 930418-10

Sample wt/vol: 5.00 (g/mL) G Lab File ID: G4615

Level: (low/med) LOW Date Received: 07/02/93

% Moisture: not dec. 4 Date Analyzed: 07/10/93

GC Column: SP-1000 ID: 2.00 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/Kg)	UG/KG	
74-87-3	Chloromethane	10	IU	
74-83-9	Bromomethane	10	IU	
75-01-4	Vinyl Chloride	10	IU	
75-00-3	Chloroethane	10	IU	
75-09-2	Methylene Chloride	10	IU	
67-64-1	Acetone	14	IU	9
75-15-0	Carbon Disulfide	10	IU	
75-35-4	1,1-Dichloroethene	10	IU	
75-34-3	1,1-Dichloroethane	10	IU	
540-59-0	1,2-Dichloroethene (total)	10	IU	
67-66-3	Chloroform	10	IU	
107-06-2	1,2-Dichloroethane	10	IU	
78-93-3	2-Butanone	10	IU	
71-55-6	1,1,1-Trichloroethane	10	IU	
56-23-5	Carbon Tetrachloride	10	IU	
75-27-4	Bromodichloromethane	10	IU	
78-87-5	1,2-Dichloropropane	10	IU	
10061-01-5	cis-1,3-Dichloropropene	10	IU	
79-01-6	Trichloroethene	10	IU	
124-48-1	Dibromochloromethane	10	IU	
79-00-5	1,1,2-Trichloroethane	10	IU	
71-43-2	Benzene	10	IU	
10061-02-6	trans-1,3-Dichloropropene	10	IU	
75-25-2	Bromoform	10	IU	
108-10-1	4-Methyl-2-Pentanone	10	IU	
591-78-6	2-Hexanone	10	IU	
127-18-4	Tetrachloroethene	10	IU	
79-34-5	1,1,2,2-Tetrachloroethane	10	IU	
108-88-3	Toluene	10	IU	
108-90-7	Chlorobenzene	10	IU	
100-41-4	Ethylbenzene	10	IU	
100-42-5	Styrene	10	IU	
1330-20-7	Xylene (total)	10	IU	

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05-SS-103

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC Case No.: 19042

SAS No.: _____ SDG No.: BMW-8

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-10

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: G4615

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 4

Date Analyzed: 07/10/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05-SS-104

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.: _____

SDG No.: BMW-8

Matrix: (soil/water) SOIL

Lab Sample ID: 930418-11

Sample wt/vol: 5.00 (g/mL) G

Lab File ID: H1665

Level: (low/med) LOW

Date Received: 07/02/93

% Moisture: not dec. 3

Date Analyzed: 07/02/93

GC Column: DB634 ID: 0.530 (mm)

Dilution Factor: 1.0

Soil Extract Volume: _____ (uL)

Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Q
74-87-3	Chloromethane	10 IU
74-83-9	Bromomethane	10 IU
75-01-4	Vinyl Chloride	10 IU
75-00-3	Chloroethane	10 IU
75-09-2	Methylene Chloride	10 IU
67-64-1	Acetone	10 IU
75-15-0	Carbon Disulfide	10 IU
75-35-4	1,1-Dichloroethene	10 IU
75-34-3	1,1-Dichloroethane	10 IU
540-59-0	1,2-Dichloroethene (total)	10 IU
67-66-3	Chloroform	10 IU
107-06-2	1,2-Dichloroethane	10 IU
78-93-3	2-Butanone	10 IU
71-55-6	1,1,1-Trichloroethane	10 IU
56-23-5	Carbon Tetrachloride	10 IU
75-27-4	Bromodichloromethane	10 IU
78-87-5	1,2-Dichloropropane	10 IU
10061-01-5	cis-1,3-Dichloropropene	10 IU
79-01-6	Trichloroethene	10 IU
124-48-1	Dibromochloromethane	10 IU
79-00-5	1,1,2-Trichloroethane	10 IU
71-43-2	Benzene	10 IU
10061-02-6	trans-1,3-Dichloropropene	10 IU
75-25-2	Bromoform	10 IU
108-10-1	4-Methyl-2-Pentanone	10 IU
591-78-6	3-Hexanone	10 IU
127-18-4	Tetrachloroethene	10 IU
79-34-5	1,1,2,2-Tetrachloroethane	10 IU
108-88-3	Toluene	10 IU
108-90-7	Chlorobenzene	10 IU
100-41-4	Ethylbenzene	10 IU
100-42-5	Styrene	10 IU
1330-20-7	Xylene (total)	10 IU

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05-SS-104

Lab Name: CEIMIC CORP Contract: BAKER

Lab Code: CEIMIC Case No.: 19042 SAS No.: _____ SDG No.: BMW-8

Matrix: (soil/water) SOIL Lab Sample ID: 930418-11

Sample wt/vol: 5.00 (g/mL) g Lab File ID: H1665

Level: (low/med) LOW Date Received: 07/02/93

% Moisture: not dec. 3 Date Analyzed: 07/02/93

GC Column: DB624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

TOTAL ORGANIC CARBON (TOC)

Method 415.1/9060

Client: Baker Environmental

Project No.: 930418

Date Received: 7/03/93

Concentration in: mg/kg*

Client ID	Laboratory ID	Sample Concentration*	% Total Solids	Date Sampled	Date Analyzed
05-SS-101	930418-08	11,000	97.6	6/30/93	7/09/93
05-SS-102	930418-09	34,900	95.9	6/30/93	7/12/93
05-SS-103	930418-10	11,800	96.3	6/30/93	7/12/93
05-SS-104	930418-11	9,520	97.0	6/30/93	7/12/93

+ Method Reporting Limit = 30.0 mg/kg

* Sample concentration is reported on a dry weight basis

Reported by:

Michael Sienicki

Approved by:

Jeffrey D. Mayman

1214000159

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

TOTAL ORGANIC CARBON (TOC)

Method 415.1/9060

Client: Baker Environmental

Project No.: 930304

Date Received: 5/15/93

Concentration in: mg/L*

Client ID	Laboratory ID	Sample Concentration	Date Sampled	Date Analyzed
05FB-101	930304-02	ND	5/14/93	5/28/93
16SS-ER	930304-08	ND	5/14/93	5/28/93

ND = Not detected

+ Method Reporting Limit = 1.0 mg/L

Reported by: Michael Siewski

Approved by: Jeffrey D. Mayman

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-101

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-03 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

ICAS No.	Analyte	Concentration	CI	Q	IM
17440-70-2	Calcium	66900			IP
17439-92-1	Lead	2.8	18	N	IF
17439-95-4	Magnesium	17400			IP

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-102

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-04 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
7440-70-2	Calcium	34600		P
7439-92-1	Lead	5.6	N	F
7439-95-4	Magnesium	14900		P

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-103

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-05 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
17440-70-2	Calcium	56800		IP
17439-92-1	Lead	214	SN	IF 32
17439-95-4	Magnesium	7280		IP

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-104

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-06 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
7440-70-2	Calcium	56700		IP
7439-92-1	Lead	6.0	N	IF
7439-95-4	Magnesium	7920		IP

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

457

TOTAL METALS

5A

SPIKE SAMPLE RECOVERY

SAMPLE ID

T05GW-104S

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR) C	Sample Result (SR) C	Spike Added (SA)	%R	IQIM
Calcium						INR
Lead	75-125	20.0500	6.0500	20.00	70.0	INF
Magnesium						INR

Comments:

468

000071

TOTAL METALS

6

DUPLICATES

SAMPLE ID

T05GW-104D

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control	Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Calcium			56656.0000		55122.0000		2.7		IP
Lead	3.0		6.0500		6.9000		13.1		IF
Magnesium	5000.0		7915.4000		7583.5000		4.3		IP

469

000172

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-105

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTD-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-07 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	CI	Q	IM
7440-70-2	Calcium	31300			IP
7439-92-1	Lead	9.0		N	IF J1
7439-95-4	Magnesium	14600			IP

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05GW-ER

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-01 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	IM
7440-70-2	Calcium	78.7	181	1P 101
7439-92-1	Lead	1.0	101 N	1P 101
7439-95-4	Magnesium	16.0	101	1P 101

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

459

TOTAL METALS

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

T05FB-101

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTD-42

SAS No.:

SDG No.: T05GWER

Matrix (soil/water): WATER

Lab Sample ID: 930304-02 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

ICAS No.	Analyte	Concentration	CI	Q	IM
17440-70-2	Calcium	96.4	184		IP 101
17439-92-1	Lead	2.5	181	N	IF 12
17439-95-4	Magnesium	24.4	181		IP

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-101

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-03 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
7439-92-1	Lead	3.0	N	F

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

520

000075

ILM03.0

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-102

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-04 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

ICAS No.	Analyte	Concentration	CI	Q	IM
7439-92-1	Lead	3.0	UI	N	IF

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-103

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-05 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

ICAS No.	Analyte	Concentration	CI	Q	IM
17439-92-1	Lead	4.1	N	F	J

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-104

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-06 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	CI	Q	IM
7439-92-1	Lead	3.0	UI	N	IF

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

523

DISSOLVED LEAD

5A

SAMPLE ID

SPIKE SAMPLE RECOVERY

D05GW-104S

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTD-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR) C	Sample Result (SR) C	Spike Added (SA)	%R (CALC)
Lead	75-125	26.9500	3.0000	20.00	134.8

Comments:

530

DISSOLVED LEAD

6

DUPLICATES

SAMPLE ID

D05GW-104D

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0.0

% Solids for Duplicate: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

	Control								
Analyte	Limit		Sample (S)		Duplicate (D)		RPD		
Lead			3.0000		3.0000				

531

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-105

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-07 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

ICAS No.	Analyte	Concentration	CI	Q	IM
17439-92-1	Lead	3.0	UI	N	IF

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05GW-ER

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-01 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
7439-92-1	Lead	3.0	N	F

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

DISSOLVED LEAD

1

INORGANIC ANALYSIS DATA SHEET

SAMPLE ID

D05FB-101

Lab Name: CEIMIC CORPORATION

Contract: BAKER

Lab Code: CEIMIC

Case No.: CTO-42

SAS No.:

SDG No.: D05GWER

Matrix (soil/water): WATER

Lab Sample ID: 931304-02 S

Level (low/med): LOW

Date Received: 05/15/93

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	Q	M
7439-92-1	Lead	3.0	N	F

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

519

000074

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05GW-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDS No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-03

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9160

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:		Q
		(ug/L or ug/Kg)	UG/L	
74-87-3	Chloromethane	10	10	10
74-83-9	Bromomethane	10	10	10
75-01-4	Vinyl Chloride	10	10	10
75-00-3	Chloroethane	10	10	10
75-09-2	Methylene Chloride	10.8	10.8	10.8
67-64-1	Acetone	17	17	17
75-15-0	Carbon Disulfide	10	10	10
75-35-4	1,1-Dichloroethene	10	10	10
75-34-3	1,1-Dichloroethane	10	10	10
540-59-0	1,2-Dichloroethene (total)	10	10	10
67-66-3	Chloroform	10	10	10
107-06-2	1,2-Dichloroethane	10	10	10
78-93-3	2-Butanone	10	10	10
71-55-6	1,1,1-Trichloroethane	10	10	10
56-23-5	Carbon Tetrachloride	10	10	10
75-27-4	Bromodichloromethane	10	10	10
78-87-5	1,2-Dichloropropane	10	10	10
10061-01-5	cis-1,3-Dichloropropene	10	10	10
79-01-6	Trichloroethene	10	10	10
124-48-1	Dibromochloromethane	10	10	10
79-00-5	1,1,2-Trichloroethane	10	10	10
71-43-2	Benzene	10	10	10
10061-02-6	trans-1,3-Dichloropropene	10	10	10
75-25-2	Bromoform	10	10	10
108-10-1	4-Methyl-2-Pentanone	10	10	10
591-78-6	2-Hexanone	10	10	10
127-18-4	Tetrachloroethene	10	10	10
79-34-5	1,1,2,2-Tetrachloroethane	10	10	10
108-88-3	Toluene	10	10	10
108-90-7	Chlorobenzene	10	10	10
100-41-4	Ethylbenzene	10	10	10
100-42-5	Styrene	10	10	10
1330-20-7	Xylene (total)	10	10	10

15
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05GW-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-03

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9160

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05GW-102

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-04

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9161

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

		CONCENTRATION UNITS:	
CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	17	
75-09-2	Methylene Chloride	104	U 6
67-64-1	Acetone	17	U 2
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	2	JX
75-34-3	1,1-Dichloroethane	67	
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-97-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
106-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
106-98-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05GW-102

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-04

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9161

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SF-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 000000	Unknown	30.01	5	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

056W-103

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDS No.: 056WER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-05

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8716

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

0

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10 3	EXU 6
67-64-1	Acetone	12	EXU 6
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U 05 2
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U 05 2
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
102-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05GW-103

Lab Name: CEIMIC CORP

Contract: BAUER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-05

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8718

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

056W-104

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 056WER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-06

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8719

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) US/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	102	U 6
67-64-1	Acetone	17	U 6
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	2	J
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	3	J
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U 2
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-3	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U 2
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05GW-104

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-06

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8719

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05GW-104MS

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-06MS

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8720

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

Q

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10.5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	35	
75-34-3	1,1-Dichloroethane	2	J
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	47	
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	50	
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	50	
108-90-7	Chlorobenzene	54	
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05GW-104MSD

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-06MSD

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8721

Level: (low/med) LOW

Date Received: 05/15/93

Moisture: not dec.

Date Analyzed: 05/20/93

Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/L

Q

74-87-3-----	Chloromethane	10	U
74-83-9-----	Bromomethane	10	U
75-01-4-----	Vinyl Chloride	10	U
75-00-3-----	Chloroethane	10	U
75-09-2-----	Methylene Chloride	10	U
67-64-1-----	Acetone	10	U
75-15-0-----	Carbon Disulfide	10	U
75-35-4-----	1,1-Dichloroethene	34	
75-34-3-----	1,1-Dichloroethane	2	J
540-59-0-----	1,2-Dichloroethene (total)	10	U
67-66-3-----	Chloroform	10	U
107-06-2-----	1,2-Dichloroethane	10	U
78-93-3-----	2-Butanone	10	U
71-55-6-----	1,1,1-Trichloroethane	10	U
56-23-5-----	Carbon Tetrachloride	10	U
75-27-4-----	Bromodichloromethane	10	U
78-87-5-----	1,2-Dichloropropane	10	U
10061-01-5-----	cis-1,3-Dichloropropene	10	U
79-01-6-----	Trichloroethene	46	
124-48-1-----	Dibromochloromethane	10	U
79-00-5-----	1,1,2-Trichloroethane	10	U
71-43-2-----	Benzene	47	
10061-02-6-----	trans-1,3-Dichloropropene	10	U
75-25-2-----	Bromoform	10	U
108-10-1-----	4-Methyl-2-Pentanone	10	U
591-78-6-----	2-Hexanone	10	U
127-18-4-----	Tetrachloroethene	10	U
79-34-5-----	1,1,2,2-Tetrachloroethane	10	U
108-88-3-----	Toluene	49	
108-90-7-----	Chlorobenzene	51	
100-41-4-----	Ethylbenzene	10	U
100-42-5-----	Styrene	10	U
1330-20-7-----	Xylene (total)	10	U

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

056W-105

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 056WER

Matrix: (soil/water) WATER

Lab Sample ID: 930307-07

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: E8722

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

0

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	20	
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	75	
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U 15 2
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U 15 2
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

OSGW-105

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDS No.: OSGWER

Matrix: (soil/water) WATER

Lab Sample ID: 930307-07

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: EB722

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/20/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05GW-ER

Client Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDS No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-01

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9158

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

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1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05GW-EP

Job Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDS No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-01

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9158

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

05FB-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-02

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9159

Level: (low/med) LOW

Date Received: 05/13/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.

COMPOUND

Q

74-87-3	Chloromethane	10	U	
74-83-9	Bromomethane	10	U	
75-01-4	Vinyl Chloride	10	U	
75-00-3	Chloroethane	10	U	
75-09-2	Methylene Chloride	10	U	6
67-64-1	Acetone	17		
75-15-0	Carbon Disulfide	10	U	
75-35-4	1,1-Dichloroethene	10	U	
75-34-3	1,1-Dichloroethane	10	U	
540-59-0	1,2-Dichloroethene (total)	10	U	
67-66-3	Chloroform	10	U	
107-06-2	1,2-Dichloroethane	10	U	
78-93-3	2-Butanone	10	U	
71-55-6	1,1,1-Trichloroethane	10	U	
56-23-5	Carbon Tetrachloride	10	U	
75-27-4	Bromodichloromethane	10	U	
78-87-5	1,2-Dichloropropane	10	U	
10061-01-5	cis-1,3-Dichloropropene	10	U	
79-01-6	Trichloroethene	10	U	
124-48-1	Dibromochloromethane	10	U	
79-00-5	1,1,2-Trichloroethane	10	U	
71-43-2	Benzene	10	U	
10061-02-6	trans-1,3-Dichloropropene	10	U	
75-25-2	Bromoform	10	U	
108-10-1	4-Methyl-2-Pentanone	10	U	
591-79-6	2-Hexanone	10	U	
127-18-4	Tetrachloroethene	10	U	
79-34-5	1,1,2,2-Tetrachloroethane	10	U	
108-88-3	Toluene	10	U	
108-90-7	Chlorobenzene	10	U	
100-41-4	Ethylbenzene	10	U	
100-42-5	Styrene	10	U	
1330-20-7	Xylene (total)	10	U	14

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

05FB-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-02

Sample wt/vol: 5.00 (g/mL) ML

Lab File ID: F9159

Level: (low/med) LOW

Date Received: 05/15/93

% Moisture: not dec.

Date Analyzed: 05/19/93

GC Column: SP-1000 ID: 2.00 (mm)

Dilution Factor: 1.0

Soil Extract Volume: (uL)

Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
=====	=====	=====	=====	=====

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05GW-101

Laboratory ID: 930304-03

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO_3)	247	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO_3^- as CaCO_3)	247	mg/L	2.0	5/21/93
pH	6.88	S.U.	---	5/21/93

* Calculated from pH and total alkalinity

Reported by:

Michael S. Smith

Approved by:

David M. Morgan

**CEIMIC
CORPORATION**

"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05GW-102

Laboratory ID: 930304-04

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO ₃)	345	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO ₃ ⁻ as CaCO ₃)	344	mg/L	2.0	5/21/93
pH	7.52	S.U.	---	5/21/93

* Calculated from pH and total alkalinity

Reported by:

Michael Sivetti

Approved by:

W. D. Maun

**CEIMIC
CORPORATION**

"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05GW-103

Laboratory ID: 930304-05

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO_3)	278	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO_3^- as CaCO_3)	278	mg/L	2.0	5/21/93
pH	6.74	S.U.	---	5/21/93

* Calculated from pH and total alkalinity

Reported by:

Michael S. Smith

Approved by:

Jeffrey D. Mayman

0001185

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05GW-104

Laboratory ID: 930304-06

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO ₃)	198	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO ₃ ⁻ as CaCO ₃)	198	mg/L	2.0	5/21/93
pH	7.05	S.U.	---	5/21/93

* Calculated from pH and total alkalinity

Reported by:

Michael S. Senechal

Approved by:

William D. Munn

CEIMIC
CORPORATION

"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05GW-105

Laboratory ID: 930304-07

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO_3)	355	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO_3^- as CaCO_3)	355	mg/L	2.0	5/21/93
pH	7.48	S.U.	---	5/21/93

* Calculated from pH and total alkalinity

Reported by:

Michael S. Smith

Approved by:

Jeffrey M. Morgan

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**CEIMIC
CORPORATION**

"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Baker Environmental

Client ID: 05FB-101

Laboratory ID: 930304-02

Date Sample Received: 5/15/93

Date Sampled: 5/14/93

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Alkalinity (as CaCO_3)	ND	mg/L	2.0	5/18/93
Bicarbonate Alkalinity* (HCO_3^- as CaCO_3)	ND	mg/L	2.0	5/21/93
pH	ND	S.U.	---	5/21/93

ND = Not detected

* Calculated from pH and total alkalinity

Reported by:

Michael S. Smith

Approved by:

Jeffrey D. Mayman

000082

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

1655-101

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-13

Sample wt/vol: 30.4 (g/mL) G

Lab File ID:

% Moisture: 11 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 100

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

12674-11-2-----	Aroclor-1016	3700	1U	
11104-28-2-----	Aroclor-1221	7400	1U	
11141-16-5-----	Aroclor-1232	3700	1U	
53469-21-9-----	Aroclor-1242	3700	1U	
12672-29-6-----	Aroclor-1248	23000	1U	2
11097-69-1-----	Aroclor-1254	3700	1U	
11096-82-5-----	Aroclor-1260	3700	1U	

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000145

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: CEIMIC CORP

Contract: BAKER

16SS-101DL

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-13DL

Sample wt/vol: 30.4 (g/mL) G

Lab File ID:

% Moisture: 11 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1000

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Q

12674-11-2-----Aroclor-1016	37000	IU	
11104-28-2-----Aroclor-1221	74000	IU	
11141-16-5-----Aroclor-1232	37000	IU	
53469-21-9-----Aroclor-1242	37000	IU	
12672-29-6-----Aroclor-1248	29000	1.2	
11097-69-1-----Aroclor-1254	37000	IU	
11096-82-5-----Aroclor-1260	37000	IU	

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000146

ID
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-102

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-14

Sample wt/vol: 30.5 (g/mL) G

Lab File ID:

% Moisture: 16 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 50.0

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Q

12674-11-2-----	Aroclor-1016	1900	IU	
11104-28-2-----	Aroclor-1221	3900	IU	
11141-16-5-----	Aroclor-1232	1900	IU	
53469-21-9-----	Aroclor-1242	1900	IU	
12672-29-6-----	Aroclor-1248	9800	IU	2
11097-69-1-----	Aroclor-1254	1900	IU	
11096-82-5-----	Aroclor-1260	1900	IU	

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-102DL

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-14DL

Sample wt/vol: 30.5 (g/mL) G

Lab File ID:

% Moisture: 16 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 500

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

12674-11-2-----	Aroclor-1016	19000	IU	
11104-28-2-----	Aroclor-1221	39000	IU	
11141-16-5-----	Aroclor-1232	19000	IU	
53469-21-9-----	Aroclor-1242	19000	IU	
12672-29-6-----	Aroclor-1248	12000	IU	
11097-69-1-----	Aroclor-1254	19000	IU	
11096-82-5-----	Aroclor-1260	19000	IU	

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000048

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-103

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 056WER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-15

Sample wt/vol: 30.0 (g/mL) G

Lab File ID:

% Moisture: 18 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 9000

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

12674-11-2-----	Aroclor-1016	360000	IU	
11104-28-2-----	Aroclor-1221	740000	IU	
11141-16-5-----	Aroclor-1232	360000	IU	
53469-21-9-----	Aroclor-1242	360000	IU	
12672-29-6-----	Aroclor-1248	1700000	IU J	2
11097-69-1-----	Aroclor-1254	360000	IU	
11096-82-5-----	Aroclor-1260	360000	IU	

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000149

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-103DL

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-15DL

Sample wt/vol: 30.0 (g/mL) G

Lab File ID:

% Moisture: 18 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 90000

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

12674-11-2-----	Aroclor-1016	3600000	IU	
11104-28-2-----	Aroclor-1221	7400000	IU	
11141-16-5-----	Aroclor-1232	3600000	IU	
53469-21-9-----	Aroclor-1242	3600000	IU	
12672-29-6-----	Aroclor-1248	2100000	SPJ	2
11097-69-1-----	Aroclor-1254	3600000	IU	
11096-82-5-----	Aroclor-1260	3600000	IU	

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000050

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-104

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-16

Sample wt/vol: 30.3 (g/mL) G

Lab File ID:

% Moisture: 13 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 60.0

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

12674-11-2-----	Aroclor-1016	2300	IU	
11104-28-2-----	Aroclor-1221	4600	IU	
11141-16-5-----	Aroclor-1232	2300	IU	
53469-21-9-----	Aroclor-1242	2300	IU	
12672-29-6-----	Aroclor-1248	2300	IU	R
11097-69-1-----	Aroclor-1254	2300	IU	
11096-82-5-----	Aroclor-1260	2300	IU	

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-104DL

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-16DL

Sample wt/vol: 30.3 (g/mL) G

Lab File ID:

% Moisture: 13 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 600

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

12674-11-2-----	Aroclor-1016	23000	IU	
11104-28-2-----	Aroclor-1221	46000	IU	
11141-16-5-----	Aroclor-1232	23000	IU	
53469-21-9-----	Aroclor-1242	23000	IU	
12672-29-6-----	Aroclor-1248	43000	IU	2
11097-69-1-----	Aroclor-1254	23000	IU	
11096-82-5-----	Aroclor-1260	23000	IU	

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-105

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-17

Sample wt/vol: 30.1 (g/mL) G

Lab File ID:

% Moisture: 10 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 20.0

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

12674-11-2	Aroclor-1016	730	IU	
11104-28-2	Aroclor-1221	1500	IU	
11141-16-5	Aroclor-1232	730	IU	
53469-21-9	Aroclor-1242	730	IU	
12672-29-6	Aroclor-1248	7100	IU	2
11097-69-1	Aroclor-1254	730	IU	
11096-82-5	Aroclor-1260	730	IU	

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-105DL

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-17DL

Sample wt/vol: 30.1 (g/mL) G

Lab File ID:

% Moisture: 10 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 200

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

12674-11-2-----	Aroclor-1016	7300	IU	
11104-28-2-----	Aroclor-1221	15000	IU	
11141-16-5-----	Aroclor-1232	7300	IU	
53469-21-9-----	Aroclor-1242	7300	IU	
12672-29-6-----	Aroclor-1248	8300	IU	2
11097-69-1-----	Aroclor-1254	7300	IU	
11096-82-5-----	Aroclor-1260	7300	IU	

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000054

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-106

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-19

Sample wt/vol: 30.3 (g/mL) G

Lab File ID:

% Moisture: 14 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 2.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L for ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

12674-11-2-----	Aroclor-1016	76	1U	
11104-28-2-----	Aroclor-1221	150	1U	
11141-16-5-----	Aroclor-1232	76	1U	
53469-21-9-----	Aroclor-1242	76	1U	
12672-29-6-----	Aroclor-1248	250	1U	2
11097-69-1-----	Aroclor-1254	76	1U	
11096-82-5-----	Aroclor-1260	76	1U	

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-107

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-19

Sample wt/vol: 30.1 (g/mL) G

Lab File ID:

% Moisture: 14 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 4.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/KG

Q

CAS NO.

COMPOUND

12674-11-2	Aroclor-1016	150	1U
11104-28-2	Aroclor-1221	310	1U
11141-16-5	Aroclor-1232	150	1U
53469-21-9	Aroclor-1242	150	1U
12672-29-6	Aroclor-1248	880	1
11097-69-1	Aroclor-1254	150	1U
11096-82-5	Aroclor-1260	150	1U

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PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-107MS

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-19MS

Sample wt/vol: 30.2 (g/mL) G

Lab File ID:

% Moisture: 14 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

319-84-6	alpha-BHC	2.0IU	
319-85-7	beta-BHC	2.0IU	
319-86-8	delta-BHC	2.0IU	
58-89-9	gamma-BHC (Lindane)	13 IP	
76-44-8	Heptachlor	10 IP	
309-00-2	Aldrin	13 IP	
1024-57-3	Heptachlor epoxide	2.0IU	
959-98-8	Endosulfan I	2.0IU	
60-57-1	Dieldrin	30 IP	
72-55-9	4,4'-DDE	3.8IU	
72-20-8	Endrin	47 I	
33213-65-9	Endosulfan II	3.8IU	
72-54-8	4,4'-DDD	3.8IU	
1031-07-8	Endosulfan sulfate	3.8IU	
50-29-3	4,4'-DDT	140 IP	
72-43-5	Methoxychlor	20 IU	
53494-70-5	Endrin ketone	3.8IU	
7421-36-3	Endrin aldehyde	3.8IU	
5103-71-9	alpha-Chlordane	2.0IU	
5103-74-3	gamma-Chlordane	2.0IU	
8001-35-2	Toxaphene	200 IU	
12674-11-2	Aroclor-1015	38 IU	
11104-28-2	Aroclor-1221	77 IU	
11141-16-5	Aroclor-1232	38 IU	
53469-21-9	Aroclor-1242	38 IU	
12672-29-6	Aroclor-1248	840 I	
11097-69-1	Aroclor-1254	38 IU	
11095-82-5	Aroclor-1260	38 IU	

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-107MSD

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-19MSD

Sample wt/vol: 30.0 (g/mL) G

Lab File ID:

% Moisture: 14 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

319-84-6	alpha-BHC	2.0IU	
319-85-7	beta-BHC	2.0IU	
319-86-8	delta-BHC	2.0IU	
58-89-9	gamma-BHC (Lindane)	13	
76-44-8	Heptachlor	7.9IP	
309-00-2	Aldrin	10	IP
1024-57-3	Heptachlor epoxide	2.0IU	
959-98-8	Endosulfan I	2.0IU	
60-57-1	Dieldrin	26	
72-55-9	4,4'-DDE	3.8IU	
72-20-8	Endrin	29	
33213-65-9	Endosulfan II	3.8IU	
72-54-8	4,4'-DDD	3.8IU	
1031-07-8	Endosulfan sulfate	3.8IU	
50-29-3	4,4'-DDT	42	
72-43-5	Methoxychlor	20	IU
53494-70-5	Endrin ketone	3.8IU	
7421-36-3	Endrin aldehyde	3.8IU	
5103-71-9	alpha-Chlordane	2.0IU	
5103-74-2	gamma-Chlordane	2.0IU	
8001-35-2	Toxaphene	200	IU
12674-11-2	Aroclor-1016	38	IU
11104-28-2	Aroclor-1221	78	IU
11141-16-5	Aroclor-1232	38	IU
53469-21-9	Aroclor-1242	38	IU
12672-29-6	Aroclor-1248	150	IP
11097-69-1	Aroclor-1254	38	IU
11096-82-5	Aroclor-1260	38	IU

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-108

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-20

Sample wt/vol: 30.0 (g/mL) G

Lab File ID:

% Moisture: 14 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

12674-11-2-----	Aroclor-1016	38	1U	
11104-28-2-----	Aroclor-1221	78	1U	
11141-16-5-----	Aroclor-1232	38	1U	
53469-21-9-----	Aroclor-1242	38	1U	
12672-29-6-----	Aroclor-1248	38	1U	
11097-69-1-----	Aroclor-1254	38	1U	
11096-82-5-----	Aroclor-1260	38	1U	

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ID
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-109

Company Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 16SS10

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-21

Sample wt/vol: 30.3 (g/mL) G

Lab File ID:

% Moisture: 17 decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 10.0

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	Q
12674-11-2-----	Aroclor-1016	390 IU
11104-28-2-----	Aroclor-1221	800 IU
11141-16-5-----	Aroclor-1232	390 IU
53469-21-9-----	Aroclor-1242	390 IU
12672-29-6-----	Aroclor-1248	1800 10 IU
11097-69-1-----	Aroclor-1254	390 IU
11096-82-5-----	Aroclor-1260	390 IU

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1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

165S-110

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 165S10

Matrix: (soil/water) SOIL

Lab Sample ID: 930304-22

Sample wt/vol: 30.4 (g/mL) G

Lab File ID:

% Moisture: 12 .. decanted: (Y/N) N

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC

Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH: 7.0

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg) UG/KG	Q
12674-11-2-----	Aroclor-1016	37 IU	
11104-28-2-----	Aroclor-1221	75 IU	
11141-16-5-----	Aroclor-1232	37 IU	
53469-21-9-----	Aroclor-1242	37 IU	
12672-29-6-----	Aroclor-1248	37 IU	
11097-69-1-----	Aroclor-1254	37 IU	
11096-82-5-----	Aroclor-1260	37 IU	

FORM I PEST

3/90

12
000014

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-111

Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC Case No.: 19042 SAS No.: SDG No.: 16SS10

Matrix: (soil/water) SOIL Lab Sample ID: 930304-23

Sample wt/vol: 30.3 (g/mL) G Lab File ID:

% Moisture: 14 decanted: (Y/N) N Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 05/26/93

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS:	
		(ug/L or ug/Kg)	UG/KG
12674-11-2-----	Aroclor-1016	38	IU
11104-28-3-----	Aroclor-1221	77	IU
11141-16-5-----	Aroclor-1232	38	IU
53469-21-9-----	Aroclor-1242	38	IU
12672-29-6-----	Aroclor-1248	38	IU
11097-69-1-----	Aroclor-1254	38	IU
11096-82-5-----	Aroclor-1260	38	IU

FORM I PEST

3/90

13 000015

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-ER1

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-09

Sample wt/vol: 1000 (g/mL) ML

Lab File ID:

% Moisture: decanted: (Y/N)

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SEPF

Date Extracted: 05/19/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/08/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH:

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
---------	----------	--	---

12674-11-2-----	Aroclor-1016	1.0IU	
11104-28-2-----	Aroclor-1221	2.0IU	
11141-16-5-----	Aroclor-1232	1.0IU	
53469-21-9-----	Aroclor-1242	1.0IU	
12672-29-6-----	Aroclor-1248	1.0IU	
11097-69-1-----	Aroclor-1254	1.0IU	
11096-82-5-----	Aroclor-1260	1.0IU	

FORM 1 PEST

3/90

47:

000058

10
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

1655-ER2

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-10

Sample wt/vol: 1000 (g/mL) ML

Lab File ID:

% Moisture: decanted: (Y/N)

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SEPF

Date Extracted: 05/19/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH:

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
---------	----------	--	---

12674-11-2-----	Aroclor-1016	1.0IU	
11104-28-2-----	Aroclor-1221	2.0IU	
11141-16-5-----	Aroclor-1232	1.0IU	
53469-21-9-----	Aroclor-1242	1.0IU	
12672-29-6-----	Aroclor-1248	1.0IU	
11097-69-1-----	Aroclor-1254	1.0IU	
11096-82-5-----	Aroclor-1260	1.0IU	

FORM I PEST

3/90

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-ER3

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-11

Sample wt/vol: 1000 (g/mL) ML

Lab File ID:

% Moisture: decanted: (Y/N)

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SEPF

Date Extracted: 05/19/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH:

Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
---------	----------	--	---

12674-11-2-----	Aroclor-1016	1.0IU	
11104-28-2-----	Aroclor-1221	2.0IU	
11141-16-5-----	Aroclor-1232	1.0IU	
53469-21-9-----	Aroclor-1242	1.0IU	
12672-29-6-----	Aroclor-1248	1.0IU	
11097-69-1-----	Aroclor-1254	1.0IU	
11096-82-5-----	Aroclor-1260	1.0IU	

FORM I PEST

3/90

49

000060

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

16SS-ER4

Lab Name: CEIMIC CORP

Contract: BAKER

Lab Code: CEIMIC

Case No.: 19042

SAS No.:

SDG No.: 05GWER

Matrix: (soil/water) WATER

Lab Sample ID: 930304-12

Sample wt/vol: 1000 (g/mL) ML

Lab File ID:

% Moisture: decanted: (Y/N)

Date Received: 05/15/93

Extraction: (SepF/Cont/Sonc) SEPF

Date Extracted: 05/19/93

Concentrated Extract Volume: 10000 (uL)

Date Analyzed: 06/09/93

Injection Volume: 1.00 (uL)

Dilution Factor: 1.00

GPC Cleanup: (Y/N) N

pH:

Sulfur Cleanup: (Y/N) N

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Q

12674-11-2-----	Aroclor-1016	1.0IU	
11104-28-2-----	Aroclor-1221	2.0IU	
11141-16-5-----	Aroclor-1232	1.0IU	
53469-21-9-----	Aroclor-1242	1.0IU	
12672-29-6-----	Aroclor-1248	1.0IU	
11097-69-1-----	Aroclor-1254	1.0IU	
11096-92-5-----	Aroclor-1260	1.0IU	

FORM I PEST

3/90

500061

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

TOTAL ORGANIC CARBON (TOC)

Method 415.1/9060

Client: Baker Environmental

Project No.: 930304

Date Received: 5/15/93

Concentration in: mg/kg*

Client ID	Laboratory ID	Sample Concentration*	% Total Solids	Date Sampled	Date Analyzed
16SS-101	930304-13	7,810	88.1	5/14/93	5/25/93
16SS-102	930304-14	12,100	85.5	5/14/93	5/25/93
16SS-103	930304-15	17,800	86.1	5/14/93	5/25/93
16SS-104	930304-16	9,420	87.0	5/14/93	5/25/93
16SS-105	930304-17	4,420	87.0	5/14/93	5/25/93
16SS-106	930304-18	6,070	87.1	5/14/93	5/25/93
16SS-107	930304-19	26,200	84.8	5/14/93	5/25/93
16SS-108	930304-20	13,300	84.2	5/14/93	5/25/93
16SS-109	930304-21	13,300	79.1	5/14/93	5/25/93
16SS-110	930304-22	6,440	86.8	5/14/93	5/25/93
16SS-111	930304-23	7,260	87.1	5/14/93	5/25/93

* Sample concentration is reported on a dry weight basis.

+ Method Reporting Limit = 30 mg/kg

Reported by: Michael S. Smith

Approved by: Jeffrey M. Morgan

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

TOTAL ORGANIC CARBON (TOC)

Method 415.1/9060

Client: Baker Environmental

Project No.: 930304

Date Received: 5/15/93

Concentration in: mg/L*

Client ID	Laboratory ID	Sample Concentration	Date Sampled	Date Analyzed
05FB-101	930304-02	ND	5/14/93	5/28/93
16SS-ER	930304-08	ND	5/14/93	5/28/93

ND = Not detected

+ Method Reporting Limit = 1.0 mg/L

Reported by:

Michael Sierochi

Approved by:

Jeffrey D. Mayman

NEW APPENDIX I

EPA REGION III RISK-BASED CONCENTRATIONS
TCL VOLATILE COMPOUNDS
JULY 11, 1994

COMPOUND	TAP WATER ($\mu\text{g/l}$)	AMBIENT AIR ($\mu\text{g/m}^3$)	FISH (mg/kg)	COMMERCIAL/ INDUSTRIAL SOIL (mg/kg)	RESIDENTIAL SOIL (mg/kg)
Chloromethane	1.4	0.99	0.24	220	49
Bromomethane	8.7	5.2	1.9	1400	110
Vinyl Chloride	0.019	0.021	0.0017	1.5	0.34
Chloroethane	8600	10000	540	410000	31000
Methylene Chloride	4.1	3.8	0.42	380	85
Acetone	3700	370	140	100000	7800
Carbon disulfide	21	10	140	100000	7800
1,1-Dichloroethene	0.044	0.036	0.0053	4.8	1.1
1,1-Dichloroethane	810	520	140	100000	7800
1,2-Dichloroethene (total)	55	33	12	9200	700
Chloroform	0.15	0.078	0.52	470	100
1,2-Dichloroethane	0.12	0.069	0.035	31	7
2-Butanone	22000	1000	810	610000	47000
1,1,1-Trichloroethane	1300	1000	120	92000	7000
Carbon Tetrachloride	0.16	0.12	0.024	22	4.9
Bromodichloromethane	0.17	0.1	0.051	46	10
1,2-Dichloropropane	0.16	0.092	0.046	42	9.4
cis-1,3-Dichloropropene	0.077	0.048	0.018	16	3.7
Trichloroethene	1.6	1	0.29	260	58
Dibromochloromethane	0.13	0.075	0.038	34	7.6
1,1,2-Trichloroethane	0.19	0.11	0.055	50	11
Benzene	0.36	0.22	0.11	99	22
trans-1,3-Dichloropropene	0.077	0.048	0.018	16	3.7
Bromoform	2.4	1.6	0.4	360	81
4-Methyl-2-pentanone	2900	84	110	82000	6300
2-Hexanone *	-	-	-	-	-
Tetrachloroethene	1.1	3.1	0.061	55	12
Toluene	750	420	270	200000	16000
1,1,2,2-Tetrachloroethane	0.052	0.031	0.016	14	3.2
Chlorobenzene	39	21	27	20000	1600
Ethyl Benzene	1300	1000	140	100000	7800
Styrene	1600	1000	270	200000	16000
Xylenes (total)	12000	7300	2700	1000000	160000

Notes:

- 1) TCL indicates Target Compound List.
- 2) * indicates compound not located on EPA Region III Risk-Based Concentrations list.

Source:

July 11, 1994 update of EPA Region III Risk-Based Concentrations (for use with Region III technical guidance on selecting exposure routes and contaminants of concern by risk-based screening) originally included as Appendix I of "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening," Region III Technical Guidance Manual, Risk Assessment, January, 1993. (EPA/903/R-93-001)

**EPA REGION III RISK-BASED CONCENTRATIONS
TCL SEMI-VOLATILE COMPOUNDS
JULY 11, 1994**

COMPOUND	TAP WATER (µg/l)	AMBIENT AIR (µg/m ³)	FISH (mg/kg)	COMMERCIAL/ INDUSTRIAL SOIL (mg/kg)	RESIDENTIAL SOIL (mg/kg)
Phenol	22000	2200	810	51000	47000
bis(2-Chloroethyl) ether	0.0092	0.0054	0.0029	2.6	0.58
2-Chlorophenol	180	18	6.8	5100	390
1,3-Dichlorobenzene	540	320	120	91000	7000
1,4-Dichlorobenzene	0.44	0.26	0.13	120	27
1,2-Dichlorobenzene	370	210	120	92000	7000
2-Methylphenol	1800	180	68	51000	3900
2,2'-oxybis (1-Chloropropane) *	-	-	-	-	-
4-Methylphenol	180	18	6.8	5100	390
N-Nitroso-di-n-propylamine	0.0098	0.0089	0.0045	0.41	0.091
Hexachloroethane	0.75	0.45	0.23	200	46
Nitrobenzene	3.4	2.1	0.88	510	39
Isophorone	71	6.6	3.3	3000	670
2-Nitrophenol *	-	-	-	-	-
2,4-Dimethylphenol	730	73	27	20000	1600
bis(2-Chloroethoxy) methane *	-	-	-	-	-
2,4-Dichlorophenol	110	11	4.1	3100	230
1,2,4-Trichlorobenzene	190	210	14	12000	780
Naphthalene	1500	150	54	41000	3100
4-Chloroaniline	150	15	5.4	4100	310
Hexachlorobutadiene	0.14	0.081	0.04	37	8.2
4-Chloro-3-methylphenol *	-	-	-	-	-
2-Methylnaphthalene *	-	-	-	-	-
Hexachlorocyclopentadiene	0.15	0.073	9.5	7200	550
2,4,6-Trichlorophenol	6.1	0.57	0.29	250	58
2,4,5-Trichlorophenol	3700	370	140	100000	7800
2-Chloronaphthalene	2900	290	110	82000	6300
2-Nitroaniline	2.2	0.21	0.081	61	4.7
Dimethylphthalate	370000	37000	14000	1000000	780000
Acenaphthylene *	-	-	-	-	-
2,6-Dinitrotoluene *	37	3.7	1.4	1000	78
3-Nitroaniline	110	11	4.1	3100	230
Acenaphthene	2200	220	81	61000	4700
2,4-Dinitrophenol	73	7.3	2.7	2000	160
4-Nitrophenol	2300	230	84	63000	4800
Dibenzofuran *	-	-	-	-	-
2,4-Dinitrotoluene	73	7.3	2.7	2000	160
Diethylphthalate	29000	2900	1100	820000	63000
4-Chlorophenyl-phenyl ether *	-	-	-	-	-
Fluorene	1500	150	54	41000	3100
4-Nitroaniline	110	11	4.1	3100	230
4,6-Dinitro-2-methylphenol *	-	-	-	-	-
N-nitrosodiphenylamine	14	1.3	0.64	580	130
4-Bromophenyl-phenylether	2100	210	78	59000	4500
Hexachlorobenzene	0.0066	0.0039	0.002	1.8	0.4
Pentachlorophenol	0.56	0.052	0.025	24	5.3
Phenanthrene *	-	-	-	-	-
Anthracene	11000	1100	410	310000	23000
Carbazole	3.4	0.31	0.16	140	32
Di-n-butylphthalate	3700	370	140	100000	7800
Fluoranthene	1500	150	54	41000	3100
Pyrene	1100	110	41	31000	2300
Butylbenzylphthalate	7300	730	270	200000	16000
3,3'-Dichlorobenzidine	0.15	0.014	0.007	6.4	1.4
Benzo(a)anthracene	0.092	0.01	0.0043	3.9	0.88
Chrysene	9.2	1	0.43	390	88
bis(2-Ethylhexyl)phthalate	4.8	0.45	0.23	200	46
Di-n-octylphthalate	730	73	27	20000	1600
Benzo(b)fluoranthene	0.092	0.01	0.0043	3.9	0.88
Benzo(k)fluoranthene	0.92	0.1	0.043	39	8.8
Benzo(a)pyrene	0.0092	0.001	0.00043	0.39	0.088
Indeno(1,2,3-cd)pyrene	0.092	0.01	0.0043	3.9	0.88
Dibenzo(a,h)anthracene	0.0092	0.001	0.00043	0.39	0.088
Benzo(ghi)perylene *	-	-	-	-	-

Notes:

- 1) TCL indicates Target Compound List.
- 2) * indicates compound not located on EPA Region III Risk-Based Concentrations list.

Source:

July 11, 1994 update of EPA Region III Risk-Based Concentrations (for use with Region III technical guidance on selecting exposure routes and contaminants of concern by risk-based screening) originally included as Appendix 1 of "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening," Region III Technical Guidance Manual, Risk Assessment, January, 1993. (EPA/600/R-93-001)

**EPA REGION III RISK-BASED CONCENTRATIONS
TCL PESTICIDES AND PCBs
JULY 11, 1994**

COMPOUND	TAP WATER ($\mu\text{g/l}$)	AMBIENT AIR ($\mu\text{g/m}^3$)	FISH (mg/kg)	COMMERCIAL/ INDUSTRIAL SOIL (mg/kg)	RESIDENTIAL SOIL (mg/kg)
alpha-BHC	0.011	0.00099	0.0005	0.45	0.10
beta-BHC	0.037	0.0035	0.0018	1.6	0.35
delta-BHC *	—	—	—	—	—
gamma-BHC (Lindane)	0.052	0.0048	0.0024	2.2	0.49
Heptachlor	0.0023	0.0014	0.0007	0.64	0.14
Aldrin	0.004	0.00037	0.00019	0.17	0.038
Heptachlor epoxide	0.0012	0.00069	0.00035	0.31	0.07
Endosulfan	220	22	8.1	6100	470
Dieldrin	0.0042	0.00039	0.0002	0.18	0.04
4,4'-DDE	0.2	0.018	0.0093	8.4	1.9
Endrin	11	1.1	0.41	310	23
4,4'-DDD	0.28	0.026	0.013	12	2.7
Endosulfan sulfate *	—	—	—	—	—
4,4'-DDT	0.2	0.018	0.0093	8.4	1.9
Methoxychlor	180	18	6.8	5100	390
Endrin ketone *	—	—	—	—	—
Endrin Aldehyde *	—	—	—	—	—
Chlordane	0.052	0.0049	0.0024	2.2	0.49
Toxaphene	0.061	0.0056	0.0029	2.6	0.58
PCBs	0.0087	0.00081	0.00041	0.37	0.083
Aroclor 1016	2.6	0.26	0.095	72	5.5

Notes:

- 1) TCL indicates Target Compound List.
- 2) PCBs indicates polychlorinated biphenyls
- 3) * indicates compound not located on EPA Region III Risk-Based Concentration list.

Source:

July 11, 1994 update of EPA Region III Risk-Based Concentrations (for use with Region III technical guidance on selecting exposure routes and contaminants of concern by risk-based screening) originally included as Appendix I of "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening," Region III Technical Guidance Manual, Risk Assessment, January, 1993. (EPA/903/R-93-001)

**EPA REGION III RISK-BASED CONCENTRATIONS
INORGANIC TARGET ANALYTE LIST
JULY 11, 1994**

COMPOUND	TAP WATER ($\mu\text{g/l}$)	AMBIENT AIR ($\mu\text{g/m}^3$)	FISH (mg/kg)	COMMERCIAL/ INDUSTRIAL SOIL (mg/kg)	RESIDENTIAL SOIL (mg/kg)
Aluminum *	—	—	—	—	—
Antimony	15	1.5	0.54	410	31
Arsenic	11	1.1	0.41	310	23
Arsenic (as carcinogen)	0.038	0.00041	0.0018	1.6	0.37
Barium	2600	0.52	95	72000	5500
Beryllium	0.016	0.00075	0.00073	0.67	0.15
Cadmium	18	0.00099	0.68	510	39
Calcium *	—	—	—	—	—
Chromium III	37000	0.0021	1400	1000000	78000
Chromium VI	180	0.00015	6.8	5100	390
Cobalt *	2200	220	81	61000	4700
Copper	1400	140	50	38000	2900
Iron *	—	—	—	—	—
Lead (tetraethyl)	0.0037	0.00037	0.00014	0.1	0.0078
Magnesium *	—	—	—	—	—
Manganese	180	0.052	6.8	5100	390
Mercury (methyl)	11	1.1	0.41	310	23
Mercury (inorganic)	11	0.31	0.41	310	23
Nickel (soluble salts)	730	73	27	20000	1600
Potassium *	—	—	—	—	—
Selenium	180	18	6.8	5100	390
Silver	180	18	6.8	5100	390
Sodium *	—	—	—	—	—
Thallium *	—	—	—	—	—
Vanadium	260	26	9.5	7200	550
Zinc	11000	1100	410	310000	23000
Cyanide (free)	730	73	27	20000	1600

Note:

- 1) * indicates compound not located on EPA Region III Risk-Based Concentrations list.

Source:

July 11, 1994 update of EPA Region III Risk-Based Concentrations (for use with Region III technical guidance on selecting exposure routes and contaminants of concern by risk-based screening) originally included as Appendix I of "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening," Region III Technical Guidance Manual, Risk Assessment, January, 1993. (EPA/903/R-93-001)

NEW APPENDIX J

OPTIONAL FORM 89 (7-90)

FAX TRANSMITTAL

of Pages 2

To ANN CARIBATO 1

From RICHT STRYKER

Phone 363 45 71

Fax # 201 535 2423

NSN 7540 01 317 7368

5095 101

GENERAL SERVICE ADMINISTRATION

Tank inlet & outlet connection, see detail

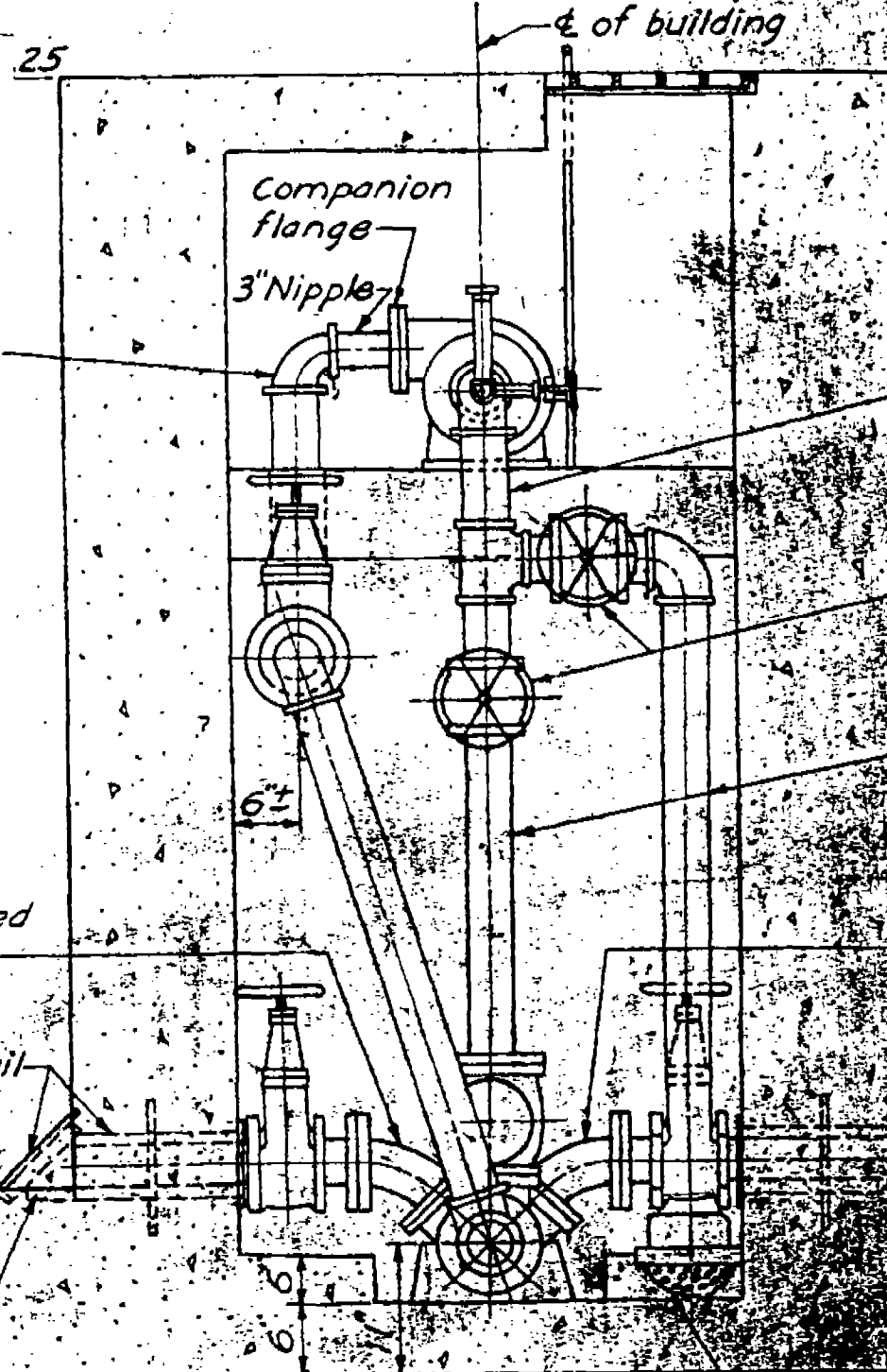
4" Flanged
45° Ell

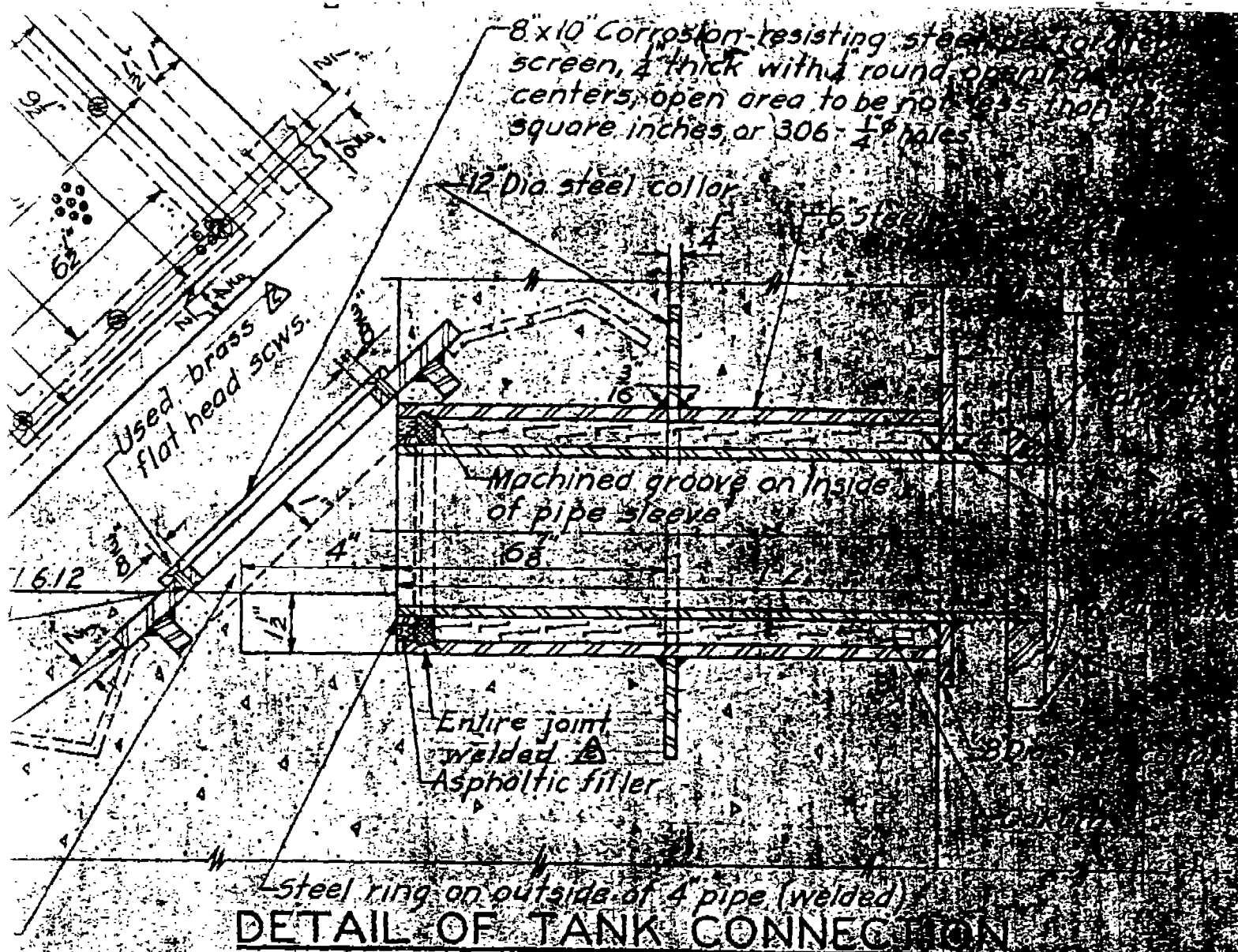
EI. 6.12

Block out concrete in 12" x 4" x 8" space
to facilitate caulking

4 x 1/2 x 6" anchor

SECTION X-X





SCALE 3/4" = 1'-0"

HARBOR DEFENSES OF CHESAPEAKE BAY
LITTLE CREEK
**MINE INSTALLATION EACH MINER
CABLE TANK BUILDING
SALT WATER SUPPLY**

IN 28 SHEETS

U.S. ENGINEER OFFICE - NORFOLK, VA

SUBMITTED BY